5-10-2020

A Bilateral Perspective of Acquisition Premiums and Post-Acquisition Performance

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University of Connecticut, 2020

In M&As, to acquire the other companies, managers usually pay a premium. In theory, the premium is explained by the market's acknowledgment of a potential increase in value for both firms standing together and coordinating their resources. The problem is that literature usually explains acquisition premium and post-acquisition performance from a one-sided price perspective. To some extent, this one-sided perspective often captures the acquirer's willingness to pay, but it underestimates the two-sided nature of any transaction; the target's perspective is usually omitted. One side sells when they perceive that the value of their asset is lower than the price paid by the buyer. Similarly, the buyer buys when they perceive that the value of the asset exceeds the price. In this three-paper dissertation, I found consistent evidence that the two-sided approach to M&A research, which, in addition to more realistic, also better explain acquisition premium and post-acquisition performance.

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A Dissertation

Submitted in Partial Fulfillment of the

Requirement for the Degree of Doctor of Philosophy at the

University of Connecticut

2020

2020

APPROVAL PAGE

Doctor of Philosophy Dissertation

A Bilateral Perspective of Acquisition Premiums and Post-Acquisition Performance

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2020

ACKNOWLEDGMENTS

Plato's Myth of the Cave illustrates that humans are impeded from seeing the truth unless they break the chains that keep them ignorant. A friend of mine, Dr. José Antonio Rosa, probably responsible for putting this idea of pursuing a PhD in my head, and the one that helped me to move forward in this adventure, once told me a phrase in a very different way than the standard meaning. When I was afraid of leaving my comfort zone to pursue a PhD, he used his own and different quotation from Juansen Dizon. José told me, "Be the author of your own destruction, and you will be in control of your future." He probably does not remember that conversation from seventeen years ago, but it was set in stone for me. He saw that being afraid to change was chaining me in a comfort position that would prevent me from growing intellectually and as a person. His advice was not to wait until bad circumstances may deteriorate my present circumstances in a way that the PhD would be only a backup option. Instead, he suggested that I be the one willing to destroy that comfortable state in a controlled manner, and that would permit me to make the most of it when moving forward to a PhD. His uncommon use and interpretation of a quotation that usually refers to yourself being your worst enemy, "I am the architect of my own destruction," was the whole point of a doctorate. I found that the essence of becoming a Doctor of Philosophy is to be able to see and interpret things differently, with an open mind and free from paradigms, in a way that you never stop saying "what if" to a question, no matter how many times others have answered or believe it is already answered. José, thank you for all the recommendation letters and advising, but mostly, thank you for helping me to break the chains and free my mind.

To the ones that took the ship with me, my wife and children. In between the tears that fall from my eyes while I am writing to you, thank you. We have passed many storms together,

and sometimes the feeling that this ship would sink was strong. As you may know, when a ship is close to sinking, rats are usually the first to abandon the ship; but you always hold tight on deck, by my side, no matter how strong the storm was our how many mistakes I made while trying to learn how to put the rudder in course. I love you guys. To our parents, who, every time that we were close to shipwreck, were always ready to tighten the mooring lines and line the bow in our rescue; they did it several times, thank you.

I also want to thank my editor, colleagues, and friends. Latif, our family will never forget that time when you picked up my daughter and me from the hospital at 2 a.m. to take us home. Also, thank you, to the ones that took the risk of believing in me when none or just a few did, and stood up in front of wrongness; thank you David for the mentoring, patience, and support. Also, thank you for all that American and academic culture you passed to me. I still remember when you told me that you would put my paper "on the back burner." Being a foreigner, and without knowing the meaning, you scared the hell out of me! How could my paper be that bad that it deserved to be burned? Thank you for all those idioms, but especially for all the friendship you offered; I hope to bring with me as much of what you are. Finally, thank you to my adversaries because this victory would not have this amazing taste without your miserable participation ;).

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INTRODUCTION TO THE DISSERTATION

Mergers and acquisitions (M&A) are a corporate strategy where managers seek to produce value by acquiring and profiting from related resources (Haleblian, Devers, McNamara, Carpenter, and Davison, 2009). However, evidence has shown a systematic value destruction pattern in M&As (Chatterjee, 1986; King *et al.*, 2004; Moeller, Schlingemann, and Stulz, 2003), which shades the pertinence of such a corporate strategy. To acquire the other companies, managers usually pay a premium that is defined as the excess of value that the acquirer is willing to pay for the M&A (Hayward and Hambrick, 1997). Why should a manager pay an acquisition premium for acquiring a company if there is a high likelihood of having low performance? In theory, the premium is explained by the market's acknowledgment of a potential increase in value for both firms standing together and coordinating their resources (Crawford and Lechner, 1996; Laamanen, 2007), which is a dilemma if post-acquisition performance tends to be negative.

Literature usually explains acquisition premium and post-acquisition performance from a one-sided price-sensitive perspective (Feldman, 2020). The main focus is the size of the premium that the acquirer is willing to pay (e.g. Haunschild, Davis-Blake, and Fichman, 1994; Kim, Haleblian, and Finkelstein, 2011; Krishnan, Hitt and Park; 2007; Rau and Vermaelen, 1998; Trautwein, 2013), and does not necessarily consider that the target does also have a sale price boundary. For example, researchers explain the premium by operationalizing the acquirer's relatedness to the target (Flanagan, 1996; Matsusaka, 1993; Singh and Montgomery, 1987) or the acquirer's CEO's retirement age (Jenter and Lewellen, 2015). To some extent, this one-sided perspective captures the acquirer's willingness to pay, but it underestimates the two-sided nature

of any transaction –bilateral dealing. One side sells when his or her expectations are that the value of their asset is lower than the price paid by the buyer. Similarly, the buyer buys when his or her expectations are that the value of the asset exceeds the price. Even in the case of several bidders (e.g. Flanagan and O'Shaughnessy, 2003), theory underestimates the relevance of the target's bargaining and opportunistic strengths, and the fact that the target's own estimation of value partially determines the premium.

Therefore, I propose to explain the level of acquisition premiums and post-acquisition performance through a bilateral transactional perspective, simultaneously including the target and the acquirer. The fact that the acquirer and the target bargain over the premium provides grounding to consider that an acquisition is a two-sided transaction, which is usually underestimated in acquisition literature (see Cuypers, Cuypers, and Martin, 2017; Seth, Song, and Pettit, 2000, 2002). For example, in 2008, Microsoft attempted to acquire Yahoo in order to increase its ability to compete with Google in the Internet search-engine industry (Rivkin and Van den Steen, 2009). But Jerry Yang prevented the acquisition by indicating to the board and to the stockholders that the premium was substantially lower than what Yahoo's value would potentially be if it continued to function alone. Assuming that capital markets theory is right, Yang's position is a dilemma because any premium offered represents above and beyond what the target is worth on its own. Yang's claim—suggesting that the premium was not high enough—provides anecdotal evidence that pricing acquisitions requires a bilateral target-acquirer approach (eventually including multiple bidders also). Given ex-post market evidence, one may argue that Yang was probably delusional about Yahoo's value. There are also cases where the target's resistance to takeover was right. For example, in 2004 Comcast offered sixty-six billion to acquire Disney, but the tender offer was rejected, and the target's value nowadays is close to

one hundred and seventy billion. Thereafter, it seems important to realize that acquirer and target make judgments about the size of an "acceptable" acquisition premium—the price that closes the transaction—, and then to account for those issues.

In this dissertation, I approach the acquisition premium from a transactional perspective, which includes a value creation and value capture mechanism (see Chatain, 2011). Using a bilateral transactional approach involves considering opportunism resulting from knowledge asymmetries (Coase, 1937; Williamson, 1975, 1985,1991) between the target and the acquirer (Coff, 1999). Then, firms with more bargaining power will comparatively capture more gains from the transaction (Porter and Millar, 1985). When I refer to value creation and value capture mechanism, I mean that firms create value by working coordinately—with or without a hierarchy—but they also need to divide the gains. How firms divide gains has been frequently reviewed in economics, and to some extent has also been reviewed in business literature. For example, in the most traditional economic theory, one may find zero-sum games (Von Neumann and Morgenstern, 2007), Shapley value (1988), classical game theory (Nash,1950, 1951) among other literature devoted to players dividing gains. Similarly, business literature has adopted some of these traditions to their own interpretation of value creation and value capture (e.g. Brandenburger and Stuart, 1996, 2007). However, in the case of acquisitions, how firms create value is usually emphasized, but how they divide it is underestimated (Cuypers, Cuypers, and Martin, 2017).

The value that firms may create by coordinating can be approached from comparing market and hierarchies; firms can create value by coordinating with or without any property transfer. From a transactional cost perspective, the hierarchy makes sense when the cost of monitoring, the frictions and/or the cost of transaction is larger than the potential benefit of

coordination (Coase, 1937; Mahoney and Qian, 2013; Williamson, 1975). There are some business situations that are not intensively reviewed but useful in the context of acquisitions because the excessive friction may trigger the takeover. Then, it is useful to model that situation as a benchmark between the acquisition and non-property transfer deals. I refer to cases where an agreement to combine resources to form synergies and to divide the gains is more difficult to reach given exacerbated tensions between the firms. In these cases, value-creating market transactions (nonhierarchical coordination) may fail to occur because the gains among the parties are so lopsided that one party expects to be worse off after entering into the agreement—specifically, when the combined outcome is larger, but one player may suffer a detrimental outcome while the other accrues most of the value. This situation is technically known in economics as a non-Pareto optimal opportunity. The non-hierarchical and the potential hierarchical solution is what I model in the first paper and test in the second one.

This scenario is important because the market frictions in such non-Pareto optimal situations are common, enduring, and fundamental to the field of strategy (Mahoney and Qian, 2013). From an acquisitions perspective, one may rely on the fact that an acquisition is a governance alternative to contracting; that may be necessary when the transactional cost of administrating such a contract is comparatively higher than the hierarchy (Williamson, 1975). The non-Pareto case probably stems from one of the larger frictions between firms because one party is directly losing value by entering into such a synergistic deal. Then, the model that I developed reviews a nonhierarchical solution for such a high-tension situation and then compares it with the alternative acquisition as a governance alternative.

DISSERTATION OVERVIEW

I propose a three-paper dissertation format to understand acquisition premiums and post-acquisition performance from a two-sided perspective that accounts for comparative governance alternatives; i.e., the value that is created by resource synergies may be achievable under a hierarchy or under a market. My approach in this dissertation considers modeling the situation of a non-Pareto optimal opportunity to be taken by two firms.

In the first paper— which originated as my qualifying paper and has been subsequently developed with contributions from my coauthors—I provide a formal modeling solution for firms coordinating in a market to divide the value from lopsided transactions without using an acquisition. This model enables coordination without the structure of a hierarchy—a model that I use later in the second paper, but from an acquisition point of view. The treatment of non-Pareto is complex because one firm is not willing to play the strategy because the expected outcome for that player is negative. In game theory jargon, firms play a strategy when it is better for them, which is not this case. What we know as Nash equilibrium occurs when firms are better off by selecting a strategy considering the other firm's potential opportunism, which is technically known as both firms' best responses functions intersection.

In business literature, value-based literature (Brandenburger and Stuart, 1996,2007) starts from finding how firms may divide gains when there is a Pareto opportunity. As mentioned before, I review a different case. This paper presents a reverse model compared to Brandenburger and Stuart's biform game; we use a cooperative-noncooperative game: an initial cooperative stage to build an indifference point through a side payment, and then a

noncooperative stage to divide the gains. We define our solution as *coordination equilibrium*, which enables market transactions to occur when one party would otherwise anticipate a net loss and avoid negotiations. The relevance of having the model that I present, is that game theory solution for these unbalanced situations, known as Nash bargaining, proposes that, when not having an agreement, firms will abandon the largest combined outcome. Further, Nash predicted that the bargaining will collapse to the Nash equilibrium, despite the fact that this is always lower in value. This situation, in addition to unrealistic, has been shown that good deal get done (Chatain and Mindruta, 2017) when considering alternative governances, like M&A and contracts.

In the second paper, I present the alternative to the nonhierarchical solution: a hierarchical solution in the form of an acquisition, centering my analysis in the acquisition premium and post-acquisition performance. I use the value creation and value capture mechanism from the first paper to model how firms divide the gains in an acquisition. I argue that when two firms work coordinately, firms' capabilities to capture value in a nonhierarchical relationship (first paper) should also explain firm value capture in the acquisition (second paper). Then, I test that premium miscalculation results from managers' knowledge-based asymmetries at the time of executing the acquisition, which also prevents them from capturing value when the arrangement is a coordination without a hierarchy. Later, post-acquisition performance is also predicted by the asymmetries in knowledge between the target and the acquirer that predicted the premium. For example, from Akerlof (1970) one can infer that low performance may result from firms buying "lemons." Differently, I suggest that firms pay more when their understanding—knowledge asymmetries— of the potential synergies between firms' valuable resources is deficient. Later, that insufficient knowledge prevents the acquirer from profitably exploiting the

acquired firm, which results in bad post-acquisition performance. Thereafter, post-acquisition performance is explained by the same asymmetric information that affects the premium.

Thereafter, instead of "lemons," it may be the case that managers simply do not know what they are buying. If one acknowledges that, the seller has incentives to push the price upwards while the buyer aims in the opposite direction (Coff, 1999). Then, the acquirer's understanding of the target's valuable resources limits the target's opportunistic behavior to obtain a larger premium. From a contrary perspective, the acquirer's lack of knowledge is reflected in the target having an additional premium capture. Later, the same lack of understanding about the other firm's business limits ex-post acquisition transferring of economic rents from the target's resources (Itami and Roehl, 1987) and accentuates complexities about the potential resource complementarity (Chen, Meng, and Li, 2017) that creates synergistic value.

The third paper is a natural progression from the first two papers, in the sense that it engages in a bilateral but non-rational explanation for acquisition premiums. When one divagates around the possibility of managers buying "lemons" (Akerlof, 1970), and my model suggesting that larger premiums and bad performance stem from managers "not knowing what they are buying," then including behavioral elements is interesting. Until this point, the dissertation provides a solution that holds and is aligned with the context of manager's resource maximization; an assumption that I bilaterally relax in this third paper. In this final paper, I present a model that account for both managers potential hubristic behavior. As Hayward and Hambrick (1997) noted, CEOs that are exacerbated overconfident, also known as hubris, are willing to pay larger premiums when having lack of monitoring from the board. This price insensitivity occurs because that CEO suffering from hubris overestimate their capability to extract value from the target. In other words, underestimates, so far, the target's management

capability to extract value. Is interesting that hubris managers also perceive their firm as under-valuated by the market (Malmendier, Tate, and Yan, 2011). Despite a few salient exceptions in post M&A literature performance (i.e. Liu, Taffler and John, 2009), scholars do not necessarily consider that the target's CEO may also suffer from overconfidence, and the self-perceived undervaluation found by Malmedier et al (2011) potentially also applies to the target's CEO. In this third paper, I research on acquisition premiums considering both CEOs, the target and the acquirer. Further, I present a mechanism that also places each manger effects over the premium in different stages for the M&A, that revels that the target's CEO hubris have a positive effect over the final premium, while the acquirer CEO hubris is more related to the initial price offered, but suppressed by the target when considering the final premium. The findings are coincident with the two examples that I presented above in the sense that the targets have judgments about the price that fulfill their aspirations.

Finally, besides each paper's particular contribution, this dissertation specifically advances strategic management theory by introducing the relevance of utilizing a bilateral approach. I show theoretically and empirically the relevance of accounting for both sides' bargaining capabilities, behavioral elements, and how that affects firms' strategies —acquisition premiums and post-acquisition performance in this case. It is important to acknowledge that considering both firms bargaining for the acquisition premium is a much more realistic scenario for the strategy research. The extant literature contribution (e.g. Haunschild, Davis-Blake, and Fichman, 1994; Hayward and Hambrick, 1997; Kim, Haleblian, and Finkelstein, 2011; Krishnan, Hitt and Park; 2007; Rau and Vermaelen, 1998; Trautwein, 2013) in terms of the acquirer's willingness to pay a premium is useful, but insufficient if we considered that the price needs to be accepted by the target. In addition, this bilateral and competitive approach may be extended to

other traditions and disciplines. For example, when referring to alliances, the same logic of requiring each party to agree is needed. In the case of variables more related to behavioral theory, like CEO's hubris (Hayward and Hambrick, 1997), it seems important to also account for the target's CEO's exacerbated self-confidence at the same time. One may expect that the target's CEO's hubris may also increase the price paid by the acquirer.

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COORDINATION EQUILIBRIA: WHEN GOOD DEALS NEED HELP GETTING DONE

ABSTRACT

In many cases, value creation requires the coordination of multiple firms. Existing strategy research focuses primarily on situations in which both firms are sufficiently remunerated so that they willingly enter into arms-length contracts or alliances. Less has been written about situations where value-creating market transactions fail to occur because the gains among the parties are so lopsided that one party expects to be worse off after entering into the agreement. When such lopsided transactions are untenable through the existing solutions—in other words, vertical integration and informal contracts—firms may be able to complete the deal by finding a *coordination equilibrium.* This paper develops the concept of coordination equilibrium, and examines the conditions under which appropriately constructed side payments allow these value-creating and value-capturing transactions to occur.

INTRODUCTION

Value-based theory (Brandenburger and Stuart, 1996, 2007), rigorously and successfully combines the concepts of value creation with value capture (Chatain and Mindruta, 2017) to explain firms' performance as a bilateral competitive mechanism between firms. The problem with value-based theory is that it is limited when covering non-Pareto opportunities, which is the case where the joint outcome is potentially larger, but one party does not participate because the gains among the parties are so lopsided that one party expects to be worse off after entering into the agreement. This scenario is important because the market frictions in such non-Pareto optimal situations are common, enduring, and fundamental to the field of strategy (Mahoney and Qian, 2013).

As one may observe, value-based theory (Brandenburger and Stuart, 1996, 2007) is fairly new, and was tremendously advanced by Brandenburger and Stuart's (2007) article "Biform Games." Published in a special issue of the *Management Science Journal* in April 2007, "Biform Games," has become seminal for the use of value-based theory (e.g., Adegbesan, 2009; Chatain, 2011; Leiblein, 2011) because it accomplished the formalization of noncooperative-cooperative games in a setting that was relevant to scholars advocating strategic management—the value creation and value capture context. In simple words, a two-by-two biform game consists of two players, where each player makes its own strategic choices to be better-off—a noncooperative stage. Then, after both players have accomplished their own strategy, they mostly compete/cooperate to divide the gains—a second cooperative stage. The problem that we anticipated above is that, when there is a non-Pareto optimal opportunity, one of the players would end up worse-off by playing the non-Pareto strategy, and then in a noncooperative scenario, the player would not play the harmful strategy.

This paper presents a reverse model compared to Brandenburger and Stuart's biform game; we use a cooperative-noncooperative game: an initial cooperative stage to build an indifference point through a side payment, and then a noncooperative stage to divide the gains. We define our solution as *coordination equilibrium*, which enables market transactions to occur when one party would otherwise anticipate a net loss and avoid negotiations. Our work initiates a search for new theory by identifying this important unmodeled issue, and offers two theoretical contributions with associated practical relevance. First, we explore in more detail a strategic alternative that is difficult to quantify: side payment contracts that transfer risk to induce specific actions by other parties. This allows firms to gain some of the benefits of contracting for the decision rights of other parties, without incurring all of the costs of hierarchical arrangements. Side payments based on the coordination equilibrium differ from informal or performance contracts because they do not rely on "the shadow of the future" to enforce cooperation (Axelrod, 1984), nor on Pareto optimal or self-enforceable opportunities (see Baker, Gibbons, and Murphy, 2002). Analyzing the coordination equilibrium provides upper and lower bounds for the size of side payments, and we extend the analysis to consider the role of transaction-specific knowledge in determining the likely distribution of value between the parties. Our discussion includes further examples of how managers can apply this reasoning to other situations.

Second, by borrowing the concept of firms' performance as a bilateral and dynamic competitive mechanism between firms, we go beyond the value-based theory literature (e.g., Brandenburger and Stuart, 1996, 2007; Chatain and Mindruta, 2017; Gans and Ryall, 2017) by constructing and solving a different class of game. We hold the concept of value creation and value capture, but our solution is different than the traditional biform game because, as

mentioned, we examine a cooperative game at its first stage, and a non-cooperative game in the second stage. Practically speaking, since the payoffs and enforceability of contracts are not often known with certainty, our model highlights the difficulty in constructing stable arrangements, and highlights the need for formal models such as this one to begin constructing a credible range of feasible side payments. For practicing managers, this model provides a sharper tool to use when constructing risk sharing or contingent performance as an alternative to contracts and vertical integrations. Simply, we extend the concepts of value creation and value capture to the scenarios where one party does not participate because the gains among the parties are so lopsided that one party expects to be worse off after entering into the agreement, which is untreatable with the theory as it is.

Third, related to our second contribution and probably our most ambitious endeavor: we divide the gains from cooperation by modeling each firm's bargaining capabilities. Different than the canonical use of utility functions in game theory, and different than several types of competition models like Cournot, Bertrand, Hotelling and Salop, among others, this paper introduces the concept of bargaining functions in a way that the division of the gains in the second stage, after coordination, results from one firm's capability to avoid the other party's opportunism. The problem with the canonical approach from economics is that firms are not always competing exactly in the same goods market, their products are not easily comparable, and actually, like in this case, one firm requires the other firm's resources to accomplish its goals. In contrast, the coordination equilibrium model is capable of explaining that firms obtain equilibrium not exclusively from intersecting their appreciation of a set of goods and services—utility function—or their cost advantages; instead, the equilibrium is reached at the point where their capability to snatch value from bargaining with the other party is equalized. Obviously, to

have a solution, such outcome asymmetry needs to be solved in terms of what we consider Nash equilibrium—by constructing a new non-empty core. We propose that such a core is better defined by the set compounded by each firm's capability to deal with the other party's opportunistic behavior—the bargaining functions—and that set, the equilibrium, fulfills the requirements to be call a stable solution.

BACKGROUND

The value created by different participants from their joint cooperation may not easily available in a common pool or initially distributed according to who created the value. Scholars have noted many cases where the initial distribution of the gains from cooperation do not reflect the respective value created by each party (Hannah, 2016; Jacobides, Knudsen, and Augier, 2006; Kim and Mahoney, 2002; Monteverde and Teece, 1982). These asymmetries in the initial value distribution may exist because of the suboptimal allocation of property and associated decision rights (Coase, 1960; Hardin, 1968; Kim and Mahoney, 2002), the presence of bottlenecks (Hannah, 2016; Jacobides *et al.*, 2006), asymmetric knowledge flows (Kang, Mahoney, and Tan, 2009), or uneven bargaining power with other value chain members (Monteverde and Teece, 1982).

Prior work indicates that such non-transactions are common (Hamel, Doz, and Prahalad, 1989; Stiglitz, 1998), and represent an inefficient outcome because the self-serving behavior of the actors involved impedes the opportunity to increase overall welfare (Kim and Mahoney, 2002). To be clear, this is not a question of simply setting the "terms of trade" for a mutually agreeable deal where a known surplus is allocated through bargaining (Mendoza, 1995). Instead, we examine situations where the reticence of a counterparty must be overcome before bargaining for potential gains to trade. Prior literature identifies three potential mechanisms: vertical

integration (full or partial through an alliance), informal or performance contracting, or a side payment to compensate the other party for their expected loss. We describe each in detail.

First, the *ex post* governance branch of organizational economics argues that vertical integration can consolidate the decision rights of two firms (Grossman and Hart, 1986; Hart, 1995; Kim and Mahoney, 2002; Mahoney, 1992; Mahoney and Qian, 2013) and confer the ability to coordinate through fiat (Coase, 1937). By allowing one firm to capture all the value created, the full benefits are internalized within one firm. However, the transaction cost economics (TCE) literature makes it clear that hierarchical arrangements have limitations. For one, vertical integration dulls the high-powered incentives of the market and impedes the specialization that generated excess returns in the first place (Williamson, 1985). In addition, vertical integration may violate antitrust laws, and the reduced U.S. merger frequency since the Clayton Act (Finkelstein, 1997) suggests a need for alternatives.

Second, informal contracting offers a viable alternative when future business or reputation make contracts self-enforcing (Baker *et al.*, 2002). Research in organizational economics argues that the benefits of future business and reputation may allow for settling up over multiple interactions that justifies the initial cost of participation. However, several conditions must be satisfied for contracts to be self-enforcing, including Pareto optimal outcomes (Levin, 2003), which is the opposite to the situation where one party faces a loss.

Third, elementary game theory provides a potential solution for asymmetric payoffs through side payments, which alter the structure of the game so that payoffs are less lopsided, and may come in the form of incentive bonuses, conditional transfers, or similar arrangements. While at first glance, side payments seem to be a trivial solution, they can be complex and fraught with hazards such as hold-up and cheating (Williamson, 1975, 1985). Existing work in

economics finds that such side payments can be endogenously defined by the parameters of the existing game (Jackson and Wilkie, 2005), but researchers in business strategy have paid less attention to the range of feasible payments, their structure, and practical implications. Moreover, side payments are incomplete contracts in that they cannot incorporate all plausible future contingencies (Grossman and Hart, 1986). Because incomplete contracts expose the firm to post-agreement haggling (Masten, 1988), firms will treat returns derived from their own operations differently from side payments made or received from other parties to induce cooperation.

Interestingly, while prior work has studied vertical integration extensively (e.g., David and Han, 2004; Mahoney and Qian, 2013) and the organizational economics literature has considered the use of informal contracting (Baker *et al.*, 2002), less attention has been given to the side payment alternative. For example, a search of all articles in the *Academy of Management Journal* found only 10 results returned for the term "side payment" in any context, with another 15 results found in *Strategic Management Journal*. All of these articles refer to side payments in passing rather than as a focal point. This lack of research may result from an emphasis in the transactions cost literature on the viewpoint of a single firm seeking to economize, without systematically accounting for payoffs to other firms. As a result, prior theorizing has largely focused on methods to acquire or control assets, rather than how to induce another party to act in accordance with the focal firm's needs (Gibbons, 2005). Likewise, in value-based strategy work, situations where gains for one party come at the expense of another have not been examined in detail (see Brandenburger and Stuart, 2007; Chatain, 2011).

Thus, we are currently at an impasse to explain how firms surmount the difficulties of motivating other parties to act when the potential for joint value creation depends on a party that lacks any self-interest to act. While the general concept of coordinating a supplier's specific

resources to achieve superior profits has been discussed previously (Anderson, Cleveland, and Schroeder, 1989; Hult, Ketchen and Nichols, 2002; Hult, Ketchen and Arrfelt, 2007), prior work has not defined the parameters needed to arrive at mutually agreeable side payments. In the following section, we develop of a formal model that explains how to make such arrangements work.

A FORMAL MODEL OF COORDINATION

As discussed, this analysis lies outside TCE's existing boundaries because the arrangement does not emerge by considering each firm's transaction costs in isolation. Finding the value-maximizing solution requires a consideration of the payoffs for both parties involved. However, the achieved solution is not equivalent to the Nash equilibria of the original games, which indicates that the managers involved have found the means to achieve an alternate equilibrium by trial and error (Camerer, 1991). Because trial-and-error is a noisy process that may inhibit the completion of some value-creating collaborations, it is useful to derive a formal model explaining how these coordination equilibria can be derived so that similar situations can be identified and exploited. We define our solution as the *coordination equilibria* of a game: a set of side payments that, subsequent to their use, induce a new Nash Equilibrium in a modified game that achieves total value creation exceeding all equilibrium states of the game without side payments.

Necessary conditions for a coordination equilibrium

The fundamental issue is that one party desires another to act in a way that results in net value creation, but is perceived as costly by that other party. This ex-ante acknowledging of the parties about a win-loss condition is what we referred to above as the situation where the gains among the parties are so unbalanced that one party expects to be worse off after entering into the

agreement. Because this results in an undesired equilibrium, the first party must offer a sufficient side payment to induce the other party to act appropriately and achieve a coordination equilibrium. This equilibrium needs to satisfy three conditions: (a) the total value created in the coordination equilibrium must exceed that of all equilibrium states of the game without side payments; (b) both parties cannot be made better off in the absence of side payments (i.e., the set of actions that constitute the coordination equilibrium cannot be Pareto-improving on their own); and therefore (c) the coordination equilibrium can only be achieved with the provision of a side payment from the party made better off to the party made worse off, relative to the payoffs they would achieve by taking action consistent with the original set of equilibrium actions.

Below, to demonstrate the mechanics of the coordination equilibrium, we analyze a generic game between a buyer and a supplier using a biform game approach. We begin with a discussion that introduces the relevant assumptions for clarifications for the game (in the Appendix, we generalize this example).

Assumptions and conditions of the biform game

As an example, to facilitate the understanding of these business situations, we present a generic game that shows a non-Pareto opportunity. To contextualize a case where these situations may occur, in Figure 1 we depict a game where the buyer's business model requires that the supplier invest in a level of capacity in excess of what is "normally" required to supply buyer's stores. In our simplified business case, that strategy permits the buyer to take advantages and obtain above-average returns by exploiting new market trends that require a quick reaction to fulfill costumers' needs, which is possible when the buyer uses the supplier's excess of capacity. However, if the game is not adapted, compared to the status quo situation, the supplier experiences loss if he agrees on investing to increasing capacity, and then the supplier is more likely to avoid participating.

Therefore, in Figure 1 the non-Pareto opportunity resides in the bottom left strategy, where the number of stores owned by the buyer is held constant, while suppliers maintain excess manufacturing capacity so that they can reduce response time. These strategies (the lower left-hand box in both panels), result in the highest possible value creation among all of the alternative action combinations.

Insert Figure 1 about here

The top panel of Figure 1 illustrates the presence of two potential equilibria (prior to the provision of side payments): a Nash Equilibrium in the bottom right quadrant where both firms do not invest, and a Pareto-improving cooperative equilibrium in the top left quadrant. The Nash equilibrium is characterized by a lack of investment by either party and precludes the buyer from exploiting its superior capacity to capture customer real time demand, while also restricting the potential throughput of supplier products through the buyer's stores. The cooperation scenario, where both firms agree to increase their throughput capacity, makes both parties better off than in the Nash equilibrium, and this situation is achievable through mutual assurance—in other words, the buyer's credible commitment to open stores, and the supplier's commitment to increase capacity.

However, based on the payoff structure shown in Figure 1, the total value of the buyer's business model is maximized only when the two firms play the strategy associated with the quadrant in the bottom left, identified as the coordination equilibrium. In this condition, a total profit of 11 is obtained (9 + 2 =11), higher than all other equilibrium conditions. Whereas the cooperation equilibrium can be achieved through simple communication between the parties, and the Nash equilibrium can be achieved under any circumstance, the coordination equilibrium can

only be obtained through a reconfiguring the pay-off structure through side payments as shown in the bottom panel of Figure 1.

While the panels in Figure 1 illustrates the normal form of the game that buyer plays with its suppliers, the more accurate representation of the buyer's and the supplier's choice structure is located in Figure 2—which recasts the "prior to side payment" and "after side payment" games as branches in a larger biform game, whose first stage is to determine whether a side payment should be made—and if so, of what magnitude. To simplify the exposition, we make three significant assumptions: that payoffs under all scenarios are known (or can be communicated) to all players, that the buyer is credibly committed to its intended actions, and that side payment contracts are enforceable (by accepting the payment, the supplier will not renege on the deal).

Insert Figure 2 about here

FINDING THE COORDINATION EQUILIBRIUM

The top branch of Figure 2 provides the transformed payoff structure that results when the buyer agrees to provide the supplier with a side payment to induce them to maintain excess capacity whilst the buyer maintains their existing number of stores. As is conventional with extensive form games, we solve using backwards induction. Since the use of a side payment essentially reveals the buyer's hand (a side-payment contract would not be written unless the buyer wishes to pursue its business model, the bottom left corner), the choice for the supplier is between investing in excess capacity or maintaining the status quo level. Since we have assumed the contract is enforceable (we review this situation later in the paper) and the side payment will only be made if the supplier makes its investment, they will do so as long as the payoff to the

supplier exceeds what it can achieve in the status quo condition (which in this example is 3). Therefore, the side payment from the buyer to the supplier will be at least 1 unit, with 1 unit (α=1) being guaranteed to make the supplier indifferent between the two options, and an additional amount subject to free-form negotiation (λ>0) which is provided to sweeten the deal for the supplier and make them prefer to invest.

Stepping backwards along this decision branch, we come to the buyer's (automatic) choice to not open new stores. Moving further backwards, we encounter buyer's choice of whether or not to offer a side payment. At this stage, the buyer must weigh the benefits of guaranteeing the supplier's choice of the buyer's most preferred outcome to the alternative outcome that it can achieve. To determine the alternative, we consider the lower branches of the decision tree, which when solved by backwards induction indicate that if the buyer is able to communicate its intentions to open stores to the supplier (which it can by our assumptions), the alternative strategy pair {Invest, Invest} will be selected, resulting in a payoff to the buyer of 5 units. With this as its point of comparison, the buyer will be willing to forgo up to 4 units in order to remain indifferent between the two alternatives (9 – 5 = 4). Since 1 unit must be transferred to the supplier to the supplier to make them indifferent, the resulting range of bargaining is between 0 and 3 units (therefore, $0 < \lambda < 3$ and $\alpha = 1$)

If these conditions for structuring the side payment are met, the transformed non-cooperative subgame in the top branch of Figure 2 meets the same stability conditions as a Nash equilibrium and will be the only such equilibrium in the transformed game. The core of the game is defined by the set of plausible side-payments made by the buyer to its supplier above the minimum indifference point payment α. The core takes the form of the open set ($\mathbf{\Lambda} = (0,3)$), and any value λ within that set is a feasible solution. The entire core $\mathbf{\Lambda}$ is split among the two parties

in some fashion, such that the overall distribution of value can be expressed as a system of equations:

(1) $V_B = 2 + \alpha + \Delta_B$ (Supplier value captured)

(2) $V_A = 9 - \alpha + \Delta_A$ (Buyer value captured)

(3) $max(\mathbf{\Lambda}) = \Delta_A + \Delta_B$ (The entirety of the core is split amongst the parties)

(4) $TV = V_A + V_B$ (Total value created equals total value captured)

where V_A represents the outcome for the buyer in the coordination equilibrium condition and V_B represents the outcome obtained by the supplier, and the portion of the core they each accrue equals Δ_A and Δ_B, respectively, and where Δ_B is equal in value to the value of λ selected. In this conceptualization, $(\alpha + \Delta_B)$ captures the required changes in the payoffs to Firm B using side payments to induce the parties take actions consistent with the coordination equilibrium.

Having shown that a coordination equilibrium is feasible for this game, we briefly explain why vertical integration and relational contracting are not preferred solutions. Vertical integration would require the buyer to manufacture—reducing its ability to specialize and further develop its capabilities in merchandising. Meanwhile, relational contracting requires repeated interactions and sufficient volume of future business for self-enforcement (Williamson, 1985). The coordination equilibrium offers greater flexibility because it does not rely on these conditions to apply.

DIVIDING THE GAINS TO COOPERATION

So far, we have demonstrated the existence of a set of coordination equilibria and the presence of the core, but have yet to consider the most likely distribution of gains. We propose a concept grounded in each party's "willingness to deal," where parties only participate in a deal if certain constraints have been satisfied.[3] This willingness is initially considered in a static manner, and

then we examine how it may change as firms accrue additional knowledge about the transaction over time, which alters the relative attractiveness of alternative governance mechanisms.

To begin, both parties must be sufficiently incentivized to negotiate before the gains from cooperation can be split. This incentive is the minimum amount of value to be captured beyond the reservation positions achieved by each firm playing alternative strategies, whose payoffs are that player's next best alternative to a negotiated agreement. For concreteness, we use the figures from the buyer-supplier game illustration while also providing a more general parameterization. The reservation positions are as follows:

(5) $R_A = E = A - \alpha - \lambda \quad = 5$ (The buyer reservation position from playing {Invest, Invest})

(6) $R_B = D = B + \alpha = 3$ (Supplier reservation position based on {Status Quo, Status Quo})

As long as the parties' reservation positions are met, bargaining can commence to allocate the core to the parties, which is the open interval (0, 3). The value selected from this interval is the additional payment made by the buyer to its supplier as an incentive.

Each firm attempts to capture as much of the core as possible, but must take into consideration the likely responses of the other firm and the alternatives to a negotiated agreement (such as vertical integration by acquiring their counterparty). The latter element is critical because negotiations may be subject to opportunistic behavior, and the attractiveness of alternatives to free-form negotiation should be considered.[4] Consistent with intuition, a party with better outside options should extract more of the surplus.

Insert Figure 3 about here

We illustrate this conclusion in Figure 3, panel (a) which shows both firms interacting while constrained by the total value to be divided (which in this example is 11 (9 + 2)). The most likely distribution depends on each firms' alternatives to the negotiated agreement, captured by their reservation position (R_A and R_B, for Firm A and B, respectively), and a bargaining function (β_A and β_B). The blue line represents Firm A's bargaining function (β_A), which depends on two parameters: Firm A's reservation position (R_A) and the maximum value conferred to Firm A (ε_A) from a completed transaction. In our formulation, the maximum value of this negotiated agreement ε_i (which is achieved at the left boundary of the domain for β_A, and the right boundary for β_B) depends on how effectively that party is able to perform the transaction themselves using their own existing resources and capabilities. We capture the attractiveness of this alternative by defining the point where the bargaining function intersects the boundary as a ratio between two factors: intrinsic uncertainty about the other firm's industry which hinders internal performance of all aspects of the transaction, and accumulated specific knowledge related to the transaction that has spilled over from one firm to the other. This ratio captures the relative benefits gained by engaging in an arms-length transaction versus using internal governance. As the ratio decreases and tends towards 0 for a particular firm, that firm has a better understanding of how to execute the transaction internally. This reduces the maximum incentive to cooperate with the other party, since a larger and larger fraction of the total value created can be captured by internalizing the transaction. Conversely, when a party is less knowledgeable about transaction details, they cannot hope to successfully execute the transaction internally, and thus derive a higher maximum benefit from engaging in a side payment deal.

As a starting point of the analysis, ε_A and ε_B are both taken to be one (an equal ratio of uncertainty to transactional knowledge), and the incremental value of an additional unit of the

core is taken to be constant (i.e., the slope is linear). The resulting bargaining functions map the best responses of each firm in a bargaining game which accounts for the bargaining profile of the other firm. With these conditions, the form of the response function for Firm A is as follows:

(7) $\beta_A = \frac{-\varepsilon_A}{[TV-R_A]}x + \varepsilon_A$

where TV is total value as defined in (4) and R_A is defined in (5). Analogously, Firm B's bargaining function (β_B) is shown as the black line that starts from B's reservation position (R_B) and rises to ε_B. In the same way, Firm B's response function can be represented thus:

(8) $\beta_B = \frac{\varepsilon_B}{[TV-R_B]}x - \frac{\varepsilon_B R_B}{[TV-R_B]}$

where R_B is defined in (6). As both functions make clear, the marginal value of an additional unit of the core[5] to each party is proportional to the maximum benefit they can attain from the transaction, and inversely proportional to the amount of value above their reservation position that is available for capture. We seek to determine the value of an $x^* = V_B$, the total value captured by Firm B, and by extension V_A= TV – x^* (or the total value less B's share), the value captured by Firm A. In order to solve for this mutually acceptable division, we solve for where the bargaining functions intersect, and evaluated for our buyer-supplier game example:

(9) $x^* = \frac{\varepsilon_A + \frac{\varepsilon_B R_B}{[TV-R_B]}}{\frac{\varepsilon_A}{[TV-R_A]} + \frac{\varepsilon_B}{[TV-R_B]}} \cong 4.7 = V_B$

Using this result, we can also determine how the core is allocated amongst the parties:

(10) $\Delta_B = 1.7$

(11) $\Delta_A = 1.3$

These results show that Firm A (the buyer) will receive a smaller proportion of the core, but still captures a larger portion of the overall value ($V_A = 5 + 1.3 = 6.3$). By contrast, Firm B (the supplier) is able to obtain a larger portion of the value subject to bargaining, but obtains a smaller

portion of the overall value generated ($V_B = 2 + 1 + 1.7 = 4.7$). This result is obtained because firm A (the buyer) derives significant value from the transaction and is willing to pay over half of the core's value, even though one unit of value has already been posted as "table stakes."

We conclude our analysis by considering how the bargaining position of firms can improve or decline over time as they learn about their partners and the details of the transaction. When parties interact with each other repeatedly, these repeated transactions can produce knowledge spillovers (Katz and Shapiro, 1985). The knowledge spillovers pertaining to the particular nature of the transaction become a specific asset for each firm. And if one firm learns more about the other's means of creating value than vice versa, that firm is in an enhanced bargaining position because a larger fraction of the joint surplus can be created using a hierarchical arrangement, exposing the other party to potential hold-up during later negotiations.

In Figure 3, panel (b), we examine a situation where Firm A's familiarity with the transaction remains the same ($\varepsilon_A = 1$) as in Figure 3 panel (a). Again, this represents an equal ratio of systemic uncertainty related to Firm B's industry, and Firm A's knowledge about that industry through repeated transacting with Firm B. In comparison, we now allow Firm B's knowledge about Firm A's business to become relatively superior (namely, its knowledge stock about the industry through transactional history doubles while uncertainty remains constant, such that $\varepsilon_B = \frac{1}{2}$). This panel graphically illustrates that this change allows Firm B to capture an even larger portion of the core, represented by the shift to the right of the intersection point between the bargaining functions. This is because Firm B's superior knowledge about the transaction allows Firm B can capture a larger fraction of the joint value created by "going it alone," providing it with a stronger bargaining position during negotiations. Indeed, applying the

formula for the value of x^* with the revised parameters, we find that a significantly larger portion of the core is captured by Firm B in this scenario.

$$(12) \qquad x^*_{(\varepsilon_A=1,\varepsilon_B=0.5)} = \frac{\varepsilon_A + \frac{\varepsilon_B R_B}{[TV-R_B]}}{\frac{\varepsilon_A}{[TV-R_A]} + \frac{\varepsilon_B}{[TV-R_B]}} \approx 5.18, \text{ implying } \Delta_B = 2.18 = (5.18 - 3)$$

In the limit, if Firm B sufficiently resolves the uncertainty about the Firm A's industry through continued investment in the transaction, the incremental value of the coordination equilibrium tends to zero, and consequently the model predicts Firm B will be indifferent between continuing the side payment contract under the conditions that the entire core is transferred to them, acquiring Firm A, or replicating Firm A's capabilities internally. Another way of characterizing this solution conceptually is that it explicitly compares the payoffs under two outcomes: the use of vertical integration and the use of the cooperation equilibrium side payment. As the loss of efficiency when using vertical integration becomes smaller in magnitude for a firm, that firm can (and will) drive a harder bargain for a greater share of the gains to cooperation. Likewise, if a firm is able to negotiate a side payment contract on unusually generous terms, it may avoid the difficulty and cost of integration through acquisition even when this solution is available.

EXTENSION AND IMPLICATIONS

Side payments are themselves specific investments into the transaction (Klein, 1996)—and there is the potential risk that a partner, upon receiving the side payment, will not follow through with their promised course of action. In our illustration, after the side payment from the buyer to the supplier, the supplier maintains control over whether or not to maintain excess capacity. As a result, the buyer is now exposed to potential opportunism if they, for example, increase transfer prices to suppliers to help pay for the investment, or provide special financing terms.

Relaxing the assumption of contract enforceability

Until now, we have assumed that the side payment could be enforced without cost. However, we now relax that constraint by considering how payoffs would differ for a non-enforceable contract and how the likelihood of non-enforceability alters the range of acceptable side payments. Specifically, consider nature as an additional player in the game who determines with probability ρ that the contract will not be enforceable. If the contract is not enforceable, this means that supplier may behave opportunistically and pocket the side payment while failing to fulfill its investment in spare capacity. Then, the expected payoff across the two states of nature must be compared with a guaranteed payoff of E such that this expected value meets or exceeds the guaranteed payoff, or:

(13) $$\rho(A - \alpha - \lambda) + (1 - \rho)(C - \alpha - \lambda) \geq E$$

Where λ is the magnitude of the incremental side payment beyond the indifference point. Solving for the maximum value of λ where the inequality still holds results in the following:

(14) $$\lambda = \rho A + (1 - \rho)\, C - \alpha - E$$

Comparing this solution to the upper bound in (14) above, we see that the maximum amount that Player 1 is willing to contribute as a side payment declines as ρ increases, since A > C by (2). As the probability of non-enforceability increases, the amount by which Player 1 is willing to sweeten the deal for Player 2 decreases. Then, if the solution to the above equation falls below zero, a coordination equilibrium through side payments will no longer be feasible. As an illustration, substituting the values for the specific buyer-supplier example are solving for the probability of non-enforceability such that the maximum value of the core $\mathbf{\Lambda}$ is 0 (implying an empty core such that both firms are indifferent to a side payment), we find that:

(15) $$\rho^* = \frac{\alpha+E-C}{A-C} = \frac{4}{7} \approx 57\%$$

In this example, if the probability of enforceability drops below 57%, the coordination equilibrium will no longer be feasible and the parties may fall back on other solutions.

Hazard reduction through multiple suppliers

As a first approximation to the collective behavior of a large number of suppliers, we modeled the overall transactional hazard using a binomial distribution. The logic behind this is that we care about the probability that one or many suppliers will not honor the contract, and that can by expressed by the binomial distribution. The question that can be solved by the binomial distribution is the probability that 1,2,…,N suppliers do not abide by the contract.

$$(16)\ \mathrm{f(x)} = \mathrm{C_x^N} * \mathrm{P^x} * (1-\mathrm{P})^{\mathrm{N-x}}$$

Equation (16) shows a binomial distribution for suppliers that elect to not honor the terms of their side payment contract, where C represents the symbol for the combinatorics function, N is the number of total suppliers, x corresponds to the number of firms that choose to renege, and P is the individual probability of any supplier to deviate from the contract. For the purposes of our analysis, we have assumed that this probability takes the form of $1/N^2$. We use this quadratic form for the probability because we expect that the individual probabilities of defection should decrease exponentially as the number of suppliers increases due to the relative increased ease of replacement and the decreased threat of holdup.

For example, take the scenario where only one supplier exists. The probability of defecting is quite high for a single supplier, consistent with the risk of opportunism and the fact that the supplier knows that they cannot be easily replaced after a defection. Now, suppose instead that one has a pool of ten suppliers; they will be less likely to cheat because the supplier knows that the retailer can easily transfer the small portion of their business to the other

suppliers. Integrating the cost of the transactional hazard over the overall probability of defection allows for a computation of the overall contracting risk, which can be compared against the gains from achieving the coordination equilibrium.

$$(17)\ \text{Expected Transactions Costs} = \text{TH} * \int_{1}^{N} C_{x}^{N} * \frac{1}{N^2}^{x} * \left(1 - \frac{1}{N^2}^{x}\right)^{N-x} dx$$

Using equation 17 above, if the buyer has ten suppliers the expected value for any combination of the ten firms deviating is 9.6%, and this figure continues to diminish as the numbers of suppliers increases. These results allow us to state that having multiple suppliers provides a safeguard against transactional hazards and helps the buyer use their side payment arrangements with one supplier to mutually reinforce the others.

DISCUSSION

When markets are unable to coordinate the actions of multiple firms, hierarchies and complex equity alliances have been proposed to align control rights, maximize joint value, and alleviate the market failure (Williamson, 1971). In this paper, we provide an alternative solution: an additional contract, namely a side payment, that induces one party to act in accordance with the other's strategy. To be clear, we do not refer to induce one party's behavior from a mechanism design perspective, where the goal is for the supplier to reveal his or her true preference (e.g., Vickrey, 1961). In the cases we presented, the incremental value creation was possible only if one party was willing *ex-ante* to adopt an *ex-post* position that directly reduced its returns through a transfer to the other party. We developed a model that meets stability requirements for an equilibrium. Thus, while competitive restrictions may make this superior alternative set of choices difficult to reach using standard market contracting alone because of win-loss (non-

Pareto optimal) dynamics, the use of a side payment allows the firms to coordinate to reach a jointly efficient outcome.

In many cases, we expect that this side payment allows for coordination between firms without a formal hierarchy (Williamson, 1971). This is important because the acquisition process can potentially destroy the value creation opportunity (Hoetker and Mellewigt, 2009), particularly if the underlying capabilities are weakly related (Lubatkin and Rogers, 1989; Rumelt, 1974) or if frictions impede the realization of complementarity after the acquisition (Mahoney and Qian, 2013). A positive aspect of side payments is lower implementation costs than investing directly in specific assets—in other words, reducing the associated "mundane transactions costs" (Langlois, 2006). Our models indicate that firms can arrange a side payment that first assuages ex-ante losses, with abnormal returns then shared between the parties. These results are obtained because the losing firm is compensated up to an indifference point before bargaining can commence. The value to reach the indifference point can be seen as a sunk cost repair, while the value shared thereafter corresponds to the marginal contribution from each participant, considered in light of the alternative means for arranging the transaction.

Mitigating the transactional hazards of side payments

While side payments may be attractive in comparison to alternative governance structures, they are not without risk. These risks include non-enforceability and consequent opportunistic behavior by counterparties. One way to mitigate the transactional hazards of side payments is by reducing behavioral uncertainty. Specifically, when the distribution of the side payment can be made conditional on the observation of the desired behavior, the risks of future welching by the counterparty are obviated. In the case of the buyer-supplier game that we presented, if the side

payment were structured in the form of a piece-rate increase in price rather than a one-off transfer to suppliers, this objective is only partially achieved.

Another way to mitigate these contracting hazards is through the simultaneous retention of multiple suppliers such that the threat of replacement by an alternative supplier keeps all suppliers from defection from the deal. In such a scenario, even though more side payments are needed to induce the coordination of more players, each contract is bilateral and for a smaller amount. As a result, the transactional hazards are "binomially divided" by the number of suppliers, each with their own idiosyncratic defection behavior. This logic is consistent with relaxing Williamson's (1985) assumption of small numbers bargaining resulting from investments in specific assets. Finally, even when side payments are not enforceable through courts, they can be self-enforcing if the value of future business under the preferred scenario exceeds the one-time benefit of welching—provided that contracts are sufficiently large and renewed on a sufficiently regular basis—as the informal contracting literature suggests.

Win-loss situations may limit the scope of transactions cost theorizing

Beyond our analysis of side payments, our model highlights a potential disconnect between Williamson's earlier work on firm responses to market failure and his later discussion of asset specificity (Williamson, 1985). Building on Coase (1937, 1960), Williamson (1971) proposes hierarchies as a potential answer for firms that must cope with a variety of market failures, including the situations described herein where the partitioning of decision rights and residual claimancy precludes the achievement of a globally optimal solution (Hardin, 1968; Kim and Mahoney, 2002). In these win-lose situations, a firm that gains from idiosyncratic bilateral synergies has an incentive to purchase its partner to align control rights (Hart, 1995). We claim that one reason a firm may incur disproportionate costs is because it bears the cost of investment

in specific assets, while the other party gains externality benefits from those investments. In other words, the party that could invest in the specific asset will bear a cost for which the beneficiary must compensate them. Failing this, the ultimate beneficiary must acquire the other party to enact the investment. By contrast, Williamson (1985) claims that the owner of the specific assets has claim over a large fraction of the bilateral symmetries, but that these gains may be appropriated by their counterparty and thus subject to opportunistic behavior. To mitigate the potential loss of these quasi-rents, the owner of these specific assets must acquire the other firm.

In other words, Williamson (1985) assumes that ownership of the specific asset implies gains that need protection, and thus the owner of the asset integrates the other party. By contrast, our model sheds light on the case where lack of ownership of the rights to invest in a specific asset necessitates the party without the decision rights to acquire the potential owner of the asset. While this argumentation is consistent with the logic of Williamson (1971), it is in contraposition to Williamson (1985). Thus, we may have found an example of a common boundary condition under which the more specific predictions of later transactions cost theorizing (e.g., Harrigan, 1986; Mahoney, 1992) related to asset specificity may not hold.

Expanding the purview of value-based business strategy

Finally, our model contributes to the literature on value-based strategy by building a form of game which, to our knowledge, has not appeared in the strategy or organizational economics literatures. Specifically, value-based theory (Brandenburger and Stuart, 1996, 2007) rigorously and successfully combines the concepts of value creation with value capture (Chatain and Mindruta, 2017) to explain firms' performance as a bilateral competitive mechanism between firms. The problem with value-based theory is that it is limited when covering non-Pareto

opportunities, which is the case where the joint outcome is potentially larger, but one party does not participate because the gains among the parties are so lopsided that one party expects to be worse off after entering into the agreement. We believe this advances our understanding by showing that the core of these cooperative games can be derived from subsequent non-cooperative games. This was necessary for understanding the dynamics of our model, and we believe the approach may be useful in studying related problems such as labor negotiations or acquisition premiums that entail dividing the potential value of working together without hierarchical governance. For example, the model could be used to determine the relative attractiveness of using mergers and acquisitions (M&A) to coordinate activities rather than more arms-length relationships that do not require property rights transfers. Assuming that internal and external transaction costs are equal in magnitude, the value created jointly through the coordination equilibrium should be comparable to the optimal acquisition premium, since that premium would be functionally equivalent to the inducement required to make the other party cooperate (Coase, 1959; Mahoney, 1992). Consequently, if the premium deviates severely from the coordination equilibrium, it indicates the acquisition may destroy value for the acquirer.

In conclusion, value is created when different members of a network bring their distinctive capabilities together. However, too many globally efficient transactions are left "on the table" because technical and competitive conditions make at least one party worse off prior to remuneration by others. By identifying the existence of coordination equilibria, and the mechanisms by which firms can achieve these equilibria, we aim to reduce the number of situations where efficient resource combinations are not achieved.

FOOTNOTES

1. Informal and performance contracts are generally limited to self-enforcing situations where both firms are better off by behaving in a mutually rewarding manner if they cooperate. This "win-win" scenario is also known as a Pareto efficient outcome. As we detail, the situation presented in this paper is different because we examine win-loss situations. Therefore, mutually self-enforcing behaviors that achieve maximum value creation do not exist, because Pareto-optimal outcomes are not necessarily value-maximizing.
2. Because our example arrangement departs from the norm between manufacturers and retailers, it goes beyond the typical terms of trade that allocate profits between well-established buyers and suppliers not embedded in the industry network.
3. This solution concept is similar to a Nash product approach, but does not rely upon the definition of utility functions for each party. A comparison of the results with a Nash product solution concept are available upon request.
4. Note that this is separate and distinct from the choice to play an alternative strategy, which is captured by the firm's reservation position. The willingness to deal relates to a choice of which governance mode should be employed to execute a chosen strategy—either a negotiated agreement or vertical integration.
5. An additional unit of the core is positive one unit for Firm B and negative one unit for Firm A.

APPENDIX

In this appendix, we generalize our model from the specific case presented in the buyer-supplier game to discuss the necessary structure of the payoffs for a coordination equilibrium to exist within an arbitrary game between two players.

Sufficient conditions for outcome values

Recall that the coordination equilibrium must satisfy three conditions: (a) the total value created in this state exceeds that of all equilibrium states in the game without side payments, (b) prior to these payments the set of actions that constitute the equilibrium is not Pareto-improving, and (c) the equilibrium can only be achieved with the provision of a side payment. To illustrate, we construct a more general form of the game played by the buyer and the supplier, with two actions available and the choice of one player to utilize a side payment. The set of jointly sufficient conditions for the payoffs provided below, where the payoffs are arrayed as shown in Figure 1.

(16) $(A+B) > \text{Max}\ (C+D, E+F, G+H)$
(17) $A > E > C > G$
(18) $D > B$
(19) $F > H$

The first of these jointly sufficient conditions ensures that the set of actions consistent with the coordination equilibrium provides the maximum amount of joint value creation. The second condition ensures that Player 1's payoffs in the coordination equilibrium state are the highest of all conditions (and therefore they are incentivized to achieve that state), while the third condition ensures that the coordination equilibrium state is not preferred by Player 2 without a side payment. The fourth condition ensures the existence of a second-best solution superior to a simultaneous game Nash equilibrium (the cooperation equilibrium in our example above). Using

these arbitrary payoffs and restrictions, we can define without loss of generality the indifference point payment as a difference of Player 2's payoffs when Player 1 chooses Option 1:

(20) $\alpha = D - B$

The set of payoffs that constitute the core can likewise be generalized to the open interval which is a function of Player 1's payoffs achievable in the coordination equilibrium state and the next best alternative, the cooperative equilibrium state:

(21) $\Lambda = (0, A - \alpha - E)$

with the specific value selected from this open interval during the course of the negotiations defined as λ.

FIGURES FIRST PAPER

Figure 1

The Buyer – Supplier Game Prior to and After Side Payment Agreements

Top Panel: Normal Form Game between Buyer and a Supplier – Prior to Side Payment Contract

Zara \ Supplier	*Invest* Increase Available Capacity (Match Zara Fast Fashion Model)	*Status Quo* Operate at Current Capacity (Traditional Supplier Model)
Invest Open Additional Stores (Traditional Retailer Model)	**Cooperative Equilibrium** Value Created = 9 **5, 4** **E, F** **Added throughput allows both firms to increase profits to a degree**	**Model Mismatch** Value Created = 4 **1, 3** **G,H** **Zara incurs costs for new stores, supplier gets no real benefit**
Status Quo Maintain Existing Footprint (Zara Fast Fashion Model)	**Coordination Equilibrium** Value Created = 11 **9, 2** **A , B** **Excess capacity is an added cost to suppliers; Affords Zara flexibility to match demand**	**Nash Equilibrium** Value Created = 5 **2 , 3** **C , D** **Status Quo Condition**

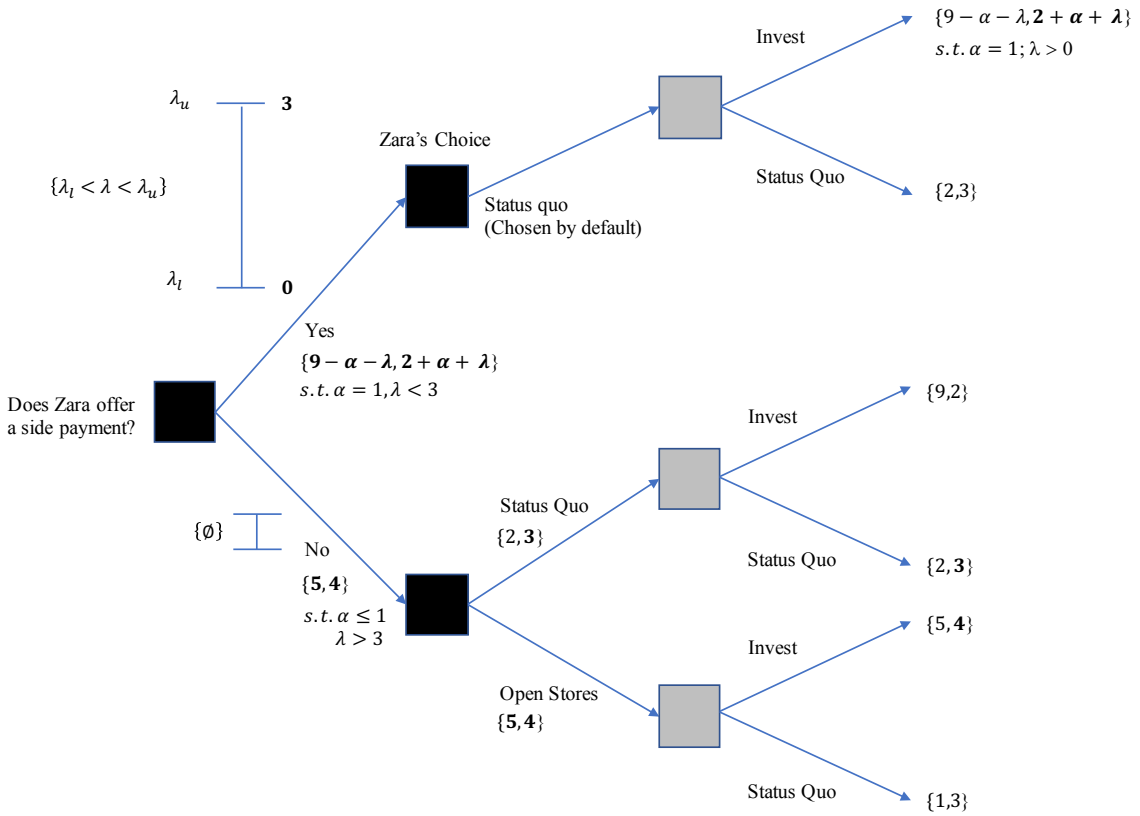
Note: Under this regime without side payments, the Nash equilibrium is the best that can be achieved unless the buyer is able to credibly commit to opening stores, at which point the cooperative equilibrium is achieved. However, neither equilibrium approach (Nash or cooperative) takes advantage of buyer's unique capabilities, reducing the overall value created.

Bottom Panel: Game between the Buyer and a Supplier – After Side Payment Contract

Zara \ Supplier	*Invest* Increase Available Capacity (Match Zara Fast Fashion Model)	*Status Quo* Operate at Current Capacity (Traditional Supplier Model)
Invest Open Additional Stores (Traditional Retailer Model)	**Cooperative Equilibrium** Value Created = 9 **5, 4** **Added throughput allows both firms to increase profits to a degree**	**Model Mismatch** Value Created = 4 **1, 3** **Zara incurs costs for new stores, supplier gets no real benefit**
Status Quo Maintain Existing Footprint (Zara Fast Fashion Model)	**Coordination Equilibrium** Value Created = 11 $9 - \alpha - \lambda, 2 + \alpha + \lambda$ if $\alpha = 1$, $0 < \lambda < 3$ **Excess capacity is an added cost to suppliers; Affords Zara flexibility to match demand**	**Nash Equilibrium** Value Created = 5 **2 , 3** **Status Quo Condition**

Note: α represents the minimum payment necessary to make the supplier indifferent between increasing its capacity and operating at its current capacity (in this case 1), and λ represents the amount of the extra value created that Zara uses as a payment to "sweeten" the deal to make the supplier prefer the coordination equilibrium outcome. This normal form representation is for expository purposes only, the conditions under which these arrangements are achievable and stable are discussed elsewhere in the paper.

Figure 2
Solving the Biform Game for Zara



Note: α represents the minimum payment necessary to make the supplier indifferent between increasing its capacity and operating at its current capacity, while λ represents the amount of the extra value created that Zara uses as a payment to "sweeten" the deal. Zara is a fashion store chain known for its expertise in demand management (Ghemawat and Nueno, 2003) and an unusual arrangement with its suppliers. Whereas typical retailers buy a large inventory of goods and use progressively higher price discounts to sell items that fall short of initial sales projections, Zara makes smaller bets on any one product line and thus carries less inventory. Consequently, Zara typically employs discounting for only 15-20% of its items for sale, well below the 45% level observed in rival retailers (Buck, 2014). The company closely monitors sales data to resolve uncertainty about customer demand and quickly re-orders high-selling items (Hansen, 2012). For Zara's strategy to be effective, its suppliers must have the ability to increase production quickly in response to identified product demand. Thus, Zara needs its suppliers to invest in excess capacity, but only intends to utilize this capacity after customer preferences have emerged.
This goes against the typical business model for clothing suppliers. Competition in this market is fierce and as a result, capacity management is a key success factor (Collins and Glendinning, 2004). For suppliers, maintaining the buffer of excess capacity required by Zara's business model is very costly and untenable without receiving some form of compensation for the added risk. In other words, the suppliers will only agree to the arrangement if they receive adequate side payments from Zara. This compensation comes in two forms: the provision of financing and other incentives to help pay for additional capacity development, and the provision of incentives of maintaining this excess capacity (Ghemawat and Nueno, 2003). For Zara, these side payments have more appeal than backwards integration into manufacturing because its distinctive competence and capabilities lie elsewhere – namely, retail merchandising and demand management. Using this alternative business model, Zara can run its stores more profitably and increase the total value generated by the supply chain, despite the costs of unused capacity borne by Zara's suppliers.
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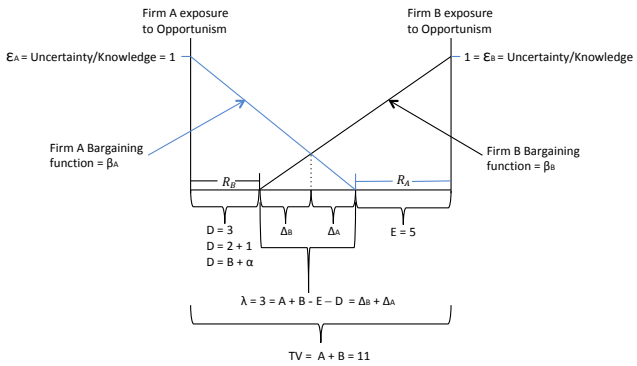
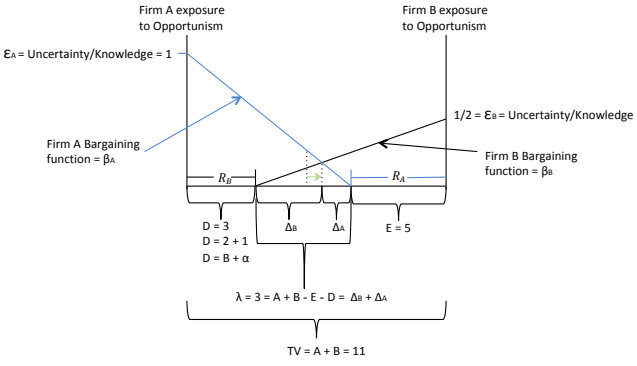
Hansen, S. 2012. How Zara Grew Into the World's Largest Fashion Retailer. Available at: http://www.nytimes.com/2012/11/11/magazine/how-zara-grew-into-the-worlds-largest-fashion-retailer.html?pagewanted=all (Retrieved January 3, 2017).

Figure 3
Determination of the Parties' Willingness to Deal



a)



b)

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DO MANAGERS KNOW WHAT THEY ARE BUYING? UNDERSTANDING ACQUISITION PREMIUMS AND POST ACQUISITION ROA

ABSTRACT

Acquisition premium researchers do not usually consider that the acquirer and the target's managers, simultaneously, bargain over the acquisition price; in the real world, the target's and the acquirer's managers are the ones who reach an agreement. From a bilateral approach, using a sample of 3,152 US mergers and acquisitions, I test several combination of knowledge asymmetries between parties that predict the premium and post-acquisition performance. Given that business literature evidence shows that post-acquisition performance is usually poor, one may be tempted to think that managers may be acquiring "lemons." Instead, I show that when managers do not have sufficient knowledge of what they are buying, premiums are larger and post-acquisition management poorer.

INTRODUCTION

Acquirers usually pay a higher price than the market's standalone target's valuation (Mulherin & Boone, 2000). The difference between the standalone valuation and the price paid for the acquisition is the "acquisition premium" and, researchers have explained it by the market's acknowledgment of a potential increase in value for both firms standing together and coordinating their resources (Crawford & Lechner, 1996; Laamanen, 2007). This understanding of acquisition premium successfully captures the notion of value creation. However, this definition falls short because both parties, acquirer and target, also compete to capture part of the value created. For example, researchers consistently and extensively refer to how firms' managers create value in an acquisition (see Barkema & Schijven, 2008 for a detailed review), but do not consistently emphasize how firms' managers divide the gains (Cuypers, Cuypers, & Martin, 2017; Seth, Song, & Pettit, 2000, 2002). I claim that this problem occurs because the strategic management literature constantly neglects the *dyadic* nature of transactions such as acquisitions (Feldman, 2019; Zajac and Olsen, 1993). A bilateral approach to how firms' managers divide the gains is central to the acquisition premium explanation because they need to arrive at an agreement that considers how much value each expects to capture. The acquisition premium, or price, is set only when the buyer and seller are in agreement; acquiring another company is a transaction in itself, and not accounting for such a fact inhibits the possibility of understanding the premium.

The theory that I propose assumes a bilateral transaction, and tests whether premium miscalculation, such as paying an "inflated price" to take over the target, is a symptom of the acquirer's managers' ex-ante knowledge limitations about the full extent

of the potential synergies and the target's managers' opportunism; this lack of knowledge, combined with the target's managers' opportunism, increases the acquisition premium. Later, this lack of knowledge shows up as an impediment to the acquirer's managers obtaining high performance—a limitation that exists because successful value extraction can only happen when managers have sufficient knowledge about the target's business (Borys & Jemison, 1989; Datta & Grant, 1990).

In arbitrage price theory (Ross, 1976a; 1976b, 2013), firms may obtain positive returns from misevaluated assets. A firm possessing superior information may profit from purchasing assets that are potentially more valuable because, ex-post acquisition, that superior knowledge provides the managers with better management skills to extract value from those assets (Dosi, Nelson, & Winter, 2001). Specifically, in the model that I present in this paper, the causal explanation for the effectiveness of post-acquisition performance is tied to information asymmetries that may lead to *additional premium capture* by the target. There is an *additional premium capture* when the target's managers opportunistically profit from having better knowledge compared to the acquirer's managers' stock of knowledge (Cuypers *et al.,* 2017). For example, one of the situations that I test in this paper—among others— correspond to the case where the target's managers may better understand that the acquirer's managers' attempted synergies highly need the target's resources, while the acquirer's managers do not understand how the acquirer's resources may be valuable in the context of the target.

Then, successful asset pricing and value extractions should occur when the acquirer's manager has sufficient knowledge about the complementarity of the target's resources in to the acquirer's context and vice versa. In this paper, I attempt a

parsimonious and comprehensive explanation for acquisition premiums and post-acquisition performance; "maybe the managers do not know what they are buying." First, I argue that the acquirer's managers' lack of knowledge is reflected in the target's having an *additional premium capture* –a sign that the acquirer lacks understanding of the other firm's business. Second, "because they do not know what they bought," the acquirer's lack of knowledge limits the transfer of economic rents from the target's resources (Itami & Roehl, 1987) or to the target's resources. This two-ways limitation also accentuates complexities about potential resource complementarity (Chen, Meng, & Li, 2017) that creates synergistic value. In consequence, this lack of knowledge responsible for larger premiums, later also limits post-acquisition performance.

In this paper, I make three contributions to the scholarship on acquisition premiums and post-acquisition performance. First, this paper provides empirical support to claims related to the relevance of considering a dyadic approach to corporate strategies involving transactions (Feldman, 2019) and value sharing between parties (Cuypers et al., 2017). Second, the model permits better prediction of acquisition premiums and post-acquisition performance when using a more realistic approach that assumes a bilateral transaction. Third, this paper shifts post-acquisition performance's causality to knowledge asymmetries that also predict the premium—and away from the bulk size of it—which reconciles the transaction cost theory literature with the strategy field's approach to post-acquisition performance.

I organized this paper as follows. First, I borrow insights from bilateral bargaining dynamics in The Coordination Equilibrium (Grove, Fox, & Souder, 2017). This model permits bilateral comparison of two different governance structures—market versus

acquisition (hierarchy)—from a knowledge asymmetry perspective. Second, I propose a set of hypotheses that focus on bilaterally testing between parties' knowledge asymmetries relationship to acquisition premiums and post-acquisition performance. Third, I provide an empirical design that operationalizes the main variables used in this research and suggests controls to test the hypotheses. Finally, I offer the results and conclusions.

COORDINATION EQUILIBRIUM AND M&A

I propose a model in which the acquirer suffers from opportunism when the target's value captured in the premium exceeds the value that the target creates when the managers are hypothetically coordinating in a market, or vice versa. There is a larger value captured by one party when the other party's managers have insufficient or unrealistic knowledge about the resource synergies that the two firms may potentially create (i.e., resource complementarities, routines and tasks).

Specifically, the coordination equilibrium (Grove, Fox, & Souder, 2017) shows that, in non-Pareto efficient conditions, an alternative to the acquisition occurs when firms' managers divide gains from working together by merely coordinating resources without any transfer of property rights. In these cases, to maximize global value creation, one party engaged in actions that made them individually worse-off, but those actions are highly beneficial for the other party. These unbalanced but potentially value creating situations are examples of non-Pareto optimal transactions. To solve such a problem, in the coordination equilibrium, firms' managers establish the portion that each one will capture by dividing the value creation from coordination and "fixing" the potential value

destruction for one of the partners. In consequence, firms distribute the value in proportion to each firm's bargaining strengths (Chatterjee, 1986, Williamson, 1985), which is a function of the simultaneous knowledge that each firm has about the other party.

Differently, in this paper I deal with the case where one party buys the other, implying that one of the partners stops managing its part of the resources that produce synergies. Then, the largest difference with the coordination equilibrium is that, after being acquired, one party will "abandon" the management of the other firm, and the other must properly manage that resource to produce value. Another difference is that the coordination equilibrium uses the assumption that both parties operate at the boundaries of their knowledge capabilities; the knowledge that each firm possesses may be asymmetric, but optimal for each one. Unfortunately, managers are not unbounded from a rational perspective and operate far from the optimal level of knowledge (Cyert & March, 1963). These knowledge limitation asymmetries between managers may result in One of the managers having better understanding about the potential synergies or limitations that stem from combining both firms' resources.

THEORY AND HYPOTHESES

I hypothesize about the effects that accounting for the other firm's valuable resources has in the acquisition premium paid and post-acquisition performance. Specifically, I focus attention on cross-citation in the patenting process as a source of knowledge transfer and knowledge capitalization between firms (Almeida, 1996), and the impact of such variables on the size of the premium and in post-acquisition performance.

It may seem axiomatic that the firm's manager that pays a lower premium captures more value. Simply, when paying a lower price, a lower price leaves the seller with a lower value (or premium) and that reduction in price represents some value capture to the acquirer. However, to date, the literature has offered no clarity about the mechanism that explains the size of the acquisition premium and how it relates to post-acquisition performance. Prior research suggests implications about potential explanatory variables, but not as formalized mechanisms. For example, scholars often explain acquisition premium size as a consequence of various precursors, depending on each tradition's paradigm; examples include maximizing behaviors (Penrose, 1959), agents prioritizing their own wealth (Trautwein, 2013), CEOs' overconfidence, or elevated core self-evaluation (Hiller & Hambrick, 2005), managers' over-commitment (Haunschild, Davis-Blake, & Fichman, 1994), managerial power and opportunism (Shleifer & Vishny, 1988), and attainment distance (Kim, Haleblian, & Finkelstein, 2011) among others. All of these studies argue that an appropriate acquisition premium size has a relevant role in post-acquisition performance (shareholders returns) because high acquisition premiums require larger synergies to offset the price paid to take over the other firm (Sirower, 1997). However, they cannot disentangle the mechanism because they do not consider the dynamic between the buyer and the seller to set the price.

A mechanism allows us to distinguish between correlation and causality (Thagard, 1998). I propose a mechanism, that consists of a bilateral approach to price the acquisition considering both parties' opportunistic behavior. The mechanism assumes that each party simultaneously attempts to capture as much value as possible. Let's say that the target is infinitely willing to charge as much as possible, while the acquirer goes

completely in the opposite direction, by attempting to pay as little as possible. As a transaction, paying a premium involves at least two parties (Cuypers, *et al.*, 2017), each of which is exposed to the other parties' opportunism—the key element that I claim as a bilateral bargaining phenomenon that explains the acquisition premium. When I refer to opportunism, I focus on the seller of a good as intrinsically pushing the price upwards, while the buyer is evidently going in the opposite direction—the target's managers want to charge as much as possible while the acquirer tries to pay the lowest price.

The implication of this transactional perspective is that, for the two firms, information asymmetry and their capability to internalize the other firm's knowledge is a source of opportunism that emerges in the bargaining power to extract rents (Coff, 1999a). Further, transaction cost economics (Williamson, 1975,1985,1991) posits that firms learn from one another over time, (Mahoney & Qian, 2013) and that knowledge is used against the other company to capture more value when a transaction occurs. This value capture occurs becase managers use what they absorbed (Cohen & Levinthal,1989, 1990) to be leveraged in future interactions with firms (Williamson, 1975, 1985, 1991), and as a consequence, build agreements in the set of solutions where each manager maximizes (Cook & Levi, 2008) any advantages coming from the knowledge they have acquired about the other firm's business (Dyer, 1997). Then, future transactions between the two parties may be a source of opportunism (Hennart & Park, 1993; Williamson, 1985) if one party has better knowledge about the other side.

From a bargaining power standpoint, the unilateral capability to capture value in a nonhierarchical relationship reduces that party's willingness to pay for acquiring the other firm (Williamson, 1991). Specifically, in the case of an acquisition premium,

asymmetric information is present in that the target and the acquirer's managers do not have complete information about each other (e.g. Kim & Mahoney, 2005), making it difficult to price the asset (Balakrishnan & Koza, 1993). This problem may be expressed as follows: Acquisition premium closes a transaction because one side, the seller, believes that his or her capability to extract value in a market/contract is lower than the price that firm is requesting; and, at the same time, the buyer perceives that the potential value extraction in a market/contract may be higher than the price that it will pay. Then, each firm's managers' deliberation between a market or a hierarchy suggests that, in each party's decision-making process, what they could obtain by competing with each other in a market/contract is potentially comparable to what may be obtained in a hierarchy/acquisition (Coase, 1937; Williamson, 1975).

Complementing this competitive and adaptive behavior perspective, transaction cost theory (TCE) also emphasizes the role of knowledge in determining firms' bargaining strengths (Porter & Millar, 1985). TCE scholars propose that, if one's knowledge cannot be protected (Williamson, 1991), one's counterpart will be capable of "snatching" more value from a potential relationship (Williamson, 1975). Then, the party that possesses the better information about the other firms is potentially capable to capture/loss more value at the acquisition transaction because its exposure to the other party's opportunism is comparatively low/high, which increases its bargaining power (Lepak, Smith & Taylor, 2007) and decreases/increases the price paid in the acquisition. If the acquirer has a knowledge advantage, it reflects in the shape of a lower price paid for the asset, while from the target's standpoint, may result in a larger premium received.

Thereafter, in the case of an acquisition premium, one party captures more value if its knowledge about the other party's valuable resources is more substantial.

The problem of pricing the asset relies not only on how much one knows about it. From the acquisition premium perspective, it also depends on the synergistic value that the target's resources and the acquirer's resources may have when combined, which is then subjective to each side's managers understanding of the joint business, and the limitations in the use of the other firm knowledge. Grimpe and Hussinger (2014) found in the European market—for the case of conflictive patents—that patenting may also produce a blocking use of knowledge that increases acquisition premiums. Simply, when a firm's patents are cited as prior art—forward citation, such a firm tends to be more appreciated by the market (Hall, Jaffe, and Trajtenberg, 2005), and in the European case, the firm's patents are necessary to clear the patent citing the prior state of the art. However, such a "grey" area is not part of the patenting process at the United States Patents and Trademark Office (USPTO), in the sense that a conflictive prior art would mean a rejection. Specifically, section 121 that restricts the patent application to a single invention because the application includes two or more independent and distinct inventions. Then, if a prior patent is "required" as part of the steps described in new invention, such a patenting attempt is rejected by the section 121 (by section 102 that refers to novelty). For example, Cotropia, Lemley and Sampat (2013) found that between 9% and 25% of the rejections occur due to section 121, where the maximum number of rejections was found in chemicals with 25% of the applications followed by biotechnology with 21%. There is a similar situation related to patents disputed by novelty and obviousness violations, which means that the owner of prior art finds that the

patent that a firm is trying to obtain infringes on the prior art or is obvious to any incumbent in that industry—what are known as section 102 and 101 violations, respectively. Despite this difference from the European and the American patenting systems, we follow Grimpe and Hussinger (2014) assuming the citation made by one company indicates that the knowledge from the cited company is relevant and potentially complementary to the firm, and having a positive effect over the price of the firm cited (Hall, Jaffe, and Trajtenberg, 2005).

The rejection and dispute of patents is a frequent situation between firms, and essential to the mechanism that I propose because it shows that firms owning patents are constantly checking for how and where their knowledge property may be infringed. Further, on average, patents are rejected in one fourth of the cases (Lemley and Sampat 2009). In addition, firms involved in industries where patenting is frequent review a large portion of new patents before incurring legal costs to dispute property rights. For example, when a patent is issued, the application form is published with a list that includes patent citations that are related to the invention that is constantly monitored by larger patent holders (Bessen & Meurer, 2006), such as public firms. In addition, scholars consider patents as reasonable measurements for firms' knowledge-based capabilities and valuable resources (Ahuja & Katila, 2001). Due to the active knowledge protection, one may argue that citations represent a knowledge awareness from both the citing and the cited firm. Then, when a patent is cited, researchers believe that the value of such a resource is greater (e.g. Grimpe & Hussinger, 2014; Hall, Jaffe, & Trajtenberg, 2005). Ahuja and Katila (2001) showed that the more a firm's patents are cited, the greater the technological knowledge that the firm possesses. Consequently, managers'

citation of other firms' patents can be interpreted as the acquirer's managers' awareness of the complementarity of those valuable resources, but at the same time as the target's awareness of the potential higher need of its resources. Then, for example, the acquirer citing the target increases the acquirer's own understanding about that knowledge-based resource's complementarity making the cited company more valuable in the acquirer context. However, at the same time, the citation by the acquirer makes the seller to opportunistically increase the price of its resources because the acquirer needs its resources. From a different perspective, citing the target's patents increases the acquirer's awareness of the private synergies Barney (1988), but limited to the context of the acquirer's business. Then, when the acquirer cites the target's patents, there is a mutual awareness of the potential synergies for the acquirer's business making the target more valuable for the acquirer, and also provides the target with bargaining power that result in the price increasing.

H1a: The acquirer's citation of the target's patents has a positive correlation with the size of the acquisition premium.

The opposite situation is the case where the target cites the acquirer. To properly cover this situation, it is important to recall two relevant issues from the model used in this paper. First, that coordination equilibrium presents the assumption that either of the two participants may be the acquirer or the target. Then, in each party's decision-making process, what they could obtain by competing with each other in a market/contract is potentially comparable to what may be obtained in a hierarchy/acquisition. In

consequence, one needs to consider that the classification of acquirer and target—when observing M&A— is a picture that shows only how the transaction ended. Then, before the bargaining ends, the target may be potentially an acquirer and vice versa. Second, from an information paradox perspective (Arrow, 1962), when the target cited the acquirer, there is a disclosure of information related to the relevance of the knowledge of the acquirer in the context of the target. To properly cover this situation and for simplification, I will refer as firm A and B without specifying yet who will become the acquirer or the target. When firms A cites firm B, B is then aware how its resources may be complementary to A. If A were buying B, B would have the advantage of understanding the potential value of its resources, and then B will behave opportunistically to increase the sale price. However, if B were buying A, the seller A now has knowledge that would permit him to bargain, based on the necessity of its resources in the context of B, but B has no knowledge to bargain with. Then, this absence of bargaining from B results in a decrease in B's capability to increase the price, when B is the seller.

As shown above, when using a bilateral approach, one needs to consider that the classification of acquirer and target is only a picture that shows how the transaction ended, and the premium is explained "similarly" to the value that the firms would obtain by mere coordination (e.g contract). When the target cited the acquirer's patents, the acquirer would have bargaining power if the seller buyer relationship were reversed. However, in this case the target possesses no knowledge about the potential value of its resources in the context of the acquirer. The information available indicates that when the target had been citing the acquirer's patents, the acquirer becomes more valuable to the

target's manager than the target to the acquirer's manager, which is reflected in a lower acquisition premium.

H1b: The target's citation of the acquirer's patents has a negative correlation with the size of the acquisition premium.

The use of a bilateral approach gains traction when considering the case where both firms have cited each other, which potentially decrease pricing errors. The literature posits that if managers miscalculate synergies, the size of the acquisition premium is larger (Hayward & Hambrick, 1997). When there is only one side citing, the other firm understand that its resources are valuable, but still has a "blind side" in terms of the value of the other firm's resources in its own business context. This situation is coincident with arbitrage price theory (Ross, 1976a; 1976b, 2013), that the lack of information increases miscalculation valuation, which may permit the other party to opportunistically profit. Thereafter, when both firms have cited each other, the situation where exclusively one firm "needs" the other dilute. When both firms know how each one resources are useful, opportunistic behavior is less likely, which decreases miscalculation. In addition, the managers from both sides also better understand the constraint of such knowledge-based resources in the context of both firms when joined. Then, cross-citation limits each side's opportunism to price the asset upward in the case of the target and downward in the case of the acquirer.

H1c: The cross-citation between the acquirer and the target has a negative correlation with the size of the acquisition premium.

Thus far, this model has emphasized opportunism and knowledge asymmetries as a potential explanation for acquisition premiums. Now, I propose that the managers' same asymmetric knowledge that predicts the premium also affects management performance ex-post acquisition. As mentioned, the coordination equilibrium model indicates that managers pay more when they miscalculate or overestimate potential synergies as well as their own capacity to extract value. The argument that maybe "managers do not know what they are buying" refers to the value extraction limitation: the knowledge asymmetries responsible for the premium miscalculation also anticipate limitations in managers' abilities to extract value. In simpler terms, there is evidence that acquisition premiums are fraught with knowledge frictions that may affect the premium, and that such information asymmetry may also account for poor post-acquisition performance (Coff, 1999a).

After the acquisition, running a business requires applicable knowledge that serves to extract value from potential superior resource synergies and complementarities (Barney, 1986; Penrose, 1959). The point now is not the only the "necessity", the question is about the sufficient knowledge to extract rents from complementarities. The problem is that, these sets of superior resources can be, at the same time, the source of a competitive advantage, but also limited when transferred to a new endeavor (Montgomery & Wernerfelt, 1988). Therefore, it is not surprising that firms showing high understanding of resource complementarity engage in acquisition because managers'

asymmetric information about the difficulty of interfirm synergies is reduced (Kaplan, Mitchell, & Wruck, 2000; Higgins & Rodriguez, 2006). For example, because managers avoid miscalculation risks, firms with resource overlap have a higher likelihood to be involved in an acquisition (Bena & Li, 2014).

In addition, in the context of valuable resources, there is evidence that patenting is responsible for competitive advantages (e.g., DeCarolis & Deeds, 1999; Grant, 1996; Hill & Deeds 1996; Zahra, Nielsen, & Bogner, 1999) because patenting is considered as a distinctive measurement for skills in the business environment where firms participate (Pavitt, Robson, & Townsend, 1989). According to the resource base view of the firm (RBV), the most relevant value-determining variable is competitive advantages (Barney, 1986), which include a firm's managers' capability to collect and interpret information about the future value of the firm's resources (Makadok & Barney, 2001). This knowledge-based situation suggests that asymmetric knowledge about potential resource synergies depicts the acquirer's managers' capability to materialize ex-post acquisition competitive advantages in the form of higher performance.

For the case where the acquirer cited the target, the acquirer's managers possess a better understanding, even practical, about how the target's resources are expected to complement with the acquirer's business. However, the absence of citation from the target posits the complexity that the acquirer's resources may be not as synergic as desired, and then the acquirer's managers may aspire to an unrealistic value extraction. In simple words, when citations are made only by the acquirer's side, the acquirer's managers may possess "half" of the story. As mentioned in the discussion preeding H1a, the acquirer understands only the necessity of the target's resources in his or her own

context, but neglects how his or her resources complement the target's business. This potential for non-complementarity undermines post-acquisition performance (Cassiman *et al*., 2005); the manager acquired a firm without understanding how his or her resources were valuable in the target's context, resulting in failure to create additional value compared to the stand alone firm (Conner, 1991).

H2a: The acquirer's citation of the target's patents has a negative correlation with post-acquisition change in return on assets.

Similarly, if the active citer is the target and not the acquirer, the understanding of the potential synergies—if there are any—resides in the target and not in the acquirer. Recalling Grimpe and Hussinger's (2014) argument about citation and firms value; the case where the target cites the acquirer provide the acquirer only with the understanding that its resources may be valuable in the context of the target, but do not provides the acquirer with the understanding about how the resources may be effectively complementary. Then, this misperception may result in that the specific potential synergies that the acquirer's managers aspired to obtain are not necessarily as valuable or may be more difficult to digest (Hennart, 1988), which should produce a negative impact on managers' performance after the acquisition. Compared to the previous hypothesis where the acquirer possesses "half" of the story, in this situation, I expect the largest negative change in return on asset because "all is unknown;" the acquirer's managers do not understand how the target's resources are synergic to the acquirer's resources, nor

understand how the acquirer's resources may be valuable in the context of the target's business.

H2b: The target's citation of the acquirer's patents has a negative correlation with post-acquisition change in return on assets.

Finally, the last hypothesis is about the case when both the acquirer and the target have cited each other. As reviewed in H1c, the acquisition premium will tend to be lower, but also, in this case I expect that the acquirer's manager will know the "complete story" in the sense of understanding, from both sides, the complementarities in order to extract better rents (Cassiman *et al*., 2005). Then, the acquirer's understanding of the bilateral synergies may create the excess of value that Conner (1991) claims as complementarity, but also should facilitate what Wernerfelt (1984) refers to as the manager's capability to gain and defend advantageous positions for both firms.

H2c: Cross-citation between the acquirer and the target's citation is positively correlated with post-acquisition change in return on assets.

EMPIRICAL DESIGN

Sample

I used a combination of different databases. First, to obtain the M&A data, I reviewed the Thomson Reuters Securities Data Company (SDC) Platinum. One of the advantages that SDC provides is the possibility of filtering by different criteria, such as whether the firms participating in the M&A are publicly traded. Recalling that the paper is centering

attention on both sides--the acquirer and the target-- when firms are publicly traded, the accounting information for both firms should be available. Similarly, having public firms also permits calculation of the acquisition premium by capturing the changes in the target's stock price before and after the acquisition. As I show below, I rely on several accounting and financial measurements to test the hypotheses. Second, the research also uses the data from NBER patent and citation project. The information about firms' patenting and citation is later combined with the M&A information from the SDC. This process is particularly complex because the number of observations at the patent citation database is around sixty-four million citations. Third, there is also information gathered from Compustat, which complements the other two databases in the sense of obtaining the return on assets linked to each one of the acquisitions.

The sample contains multi-industry data for two reasons. First, acquisition and acquisition premiums are a transversal type of phenomenon, which may occur across different types of industries. Second, because I consider only acquisitions between public firms, using only one industry segment does not produce a sufficiently large number of acquisitions to properly proceed with an adequate statistical method, nor for having enough explanatory power.

Therefore, the final sample used in this paper corresponds to 3,153 M&A that occurred between 1990 and 2006. The upper bound limitation occurs because the NBER project has only the patenting and citation database until the year 2006. The lower boundary attempts to capture a large period of M&A, but also accounts for the explosive patenting registration that occurred after 1990 (Funk, 2018) and the two intensive M&A waves that occurred from 1990 until 2010 (Cordeiro, 2014), which necessarily requires

citing other patents. The process to build this database was first to obtain all the completed domestic M&A that occurred within the time frame 1990-2006, producing a sample of 4,784 M&A. After this process, I subsampled for acquisition premiums between (0%,100%) that provided me with a total of 3,153 M&A. There are five reasons to support this data sampling. First, the definition of premiums implies that firms pay an additional value—compared to the spot price—given the potential synergies between firms (Crawford & Lechner, 1996; Laamanen, 2007; Mulherin & Boone, 2000), so "premiums" below 0% are beyond the scope of this paper. Second, the statistical method used in this paper relies on the normality assumption, which is also violated if the sample is not trimmed as suggested. As Figure 1 panel a) shows, the histogram for the acquisition premiums not censored to maximum premium of 100%, shows a long and thick right tale.

Insert Figure 1 about here

In panel a) the area demarked as "Zone excluded" corresponds to the premiums that are not accounted for in this paper. Later, in panel b) one may observe that the data better resembles the normality assumption. Third, the premiums that exceeded 100% were also excluded because there are several cases where the target's stock price did not accomplish the public firm listing standards. For example, in the data there are several cases where the acquirer paid more than 1,000% of the spot value of the target. Some of those companies had values below one dollar (270 firms), or even lower than ten cents for some of them (37 firms). As is well known, when a firm's stock remains under one dollar, the firm is usually delisted and the trade occurs over the counter (OTC), only

supervised by an exchange. The nature of such deals blurs the analysis because for delisted stocks, the valuation of the firm may be explained by private estimation of the price, which may produce this type of inflated premium. Fourth, the average for the acquisition premium in panel a) is 138%, which is outside of the extant scope found in acquisition premium research, and what one may find "reasonable" when buying other company. For example, firms may collapse after paying too much for a target, which is the case of Campeau that paid a 124% premium for Federated Department Stores, and one year after declared bankruptcy (Trachtenberg, Meinbardis & Hiller, 1990). In terms of research scope, premiums in the US are usually, on average, between 30-50 percent (Laamanem, 2007), an average that is consistent with most of the M&A literature (e.g. Beckman & Haunschild, 2002; Hayward & Hambrick 1997; Reuer, Tong & Wu, 2012; Varaiya and Ferris, 1987). I believe that this difference from the original sample results from the exceptionally large sample size that was obtained without no cutting criteria. For example, Hayward and Hambrick used a handful of acquisitions above one hundred million dollars, that produced 109 observations. Similarly, most of the relevant literature cited in this paper uses samples below 500 observations. Differently, I included all the domestic M&A that occurred between 1990 and 2006.

Finally, for the second model—which relates the treatments to the change in ROA— the sample was reduced due to missing data in COMPUSTAT. I found that this problem is frequent in business literature, that had even motivated literature to document the problem and the potential solutions (e.g. Bennin, 1980; Casey, Gao, Kirshenheiter & Pandit, 2015; Kinney & Swanson, 1993). This missing data is also present in acquisition premium literature, for example, Laamanen (2007) reduced his sample from 1,049 M&A

events to 458, due to identification issues that represented more than 50% of his sample. For this paper, the sample that contains change in ROA as a dependent variable has a size of 2,488 M&A events, which is equivalent to losing 21% of the sample from the original 3,153 observations. The loss of observations is considerably less than 50%, which may be explain, in this case, given that the access to computational tools and power were not present around fifteen years ago. For example, computational tools permit today to process data using the Levenshtein distance (for details see Yujian and Bo, 2007), or colloquially known as Fuzzy mergers. This type of technique requires computational power that permits matches between company names that may appear different for the computer, but they are the same; like comparing Apple to Apple Inc and to Apple Inc., which are clearly the same company. When I refer to computational power, this paper to execute Fuzzy mergers with the patenting database —sixty-four million observations— required a computer holding more than 75GB of RAM memory, and with the capacity to access several cores simultaneously (Proudly done on a Mac server). Finally, the missing data is also part of the problem that reduced the sample in a 21%, which is also a common problem in COMPUSTAT, since its insertion until today(e.g. Casey, Gao, Kirshenheiter & Pandit, 2015; Kinney & Swanson, 1993).

Dependent variables

I used a difference in difference model to explain acquisition premium and post-acquisition performance. Endogeneity is a common problem in business research (Hamilton & Nickerson, 2003, Shaver, 1998), and in this case using a difference in differences technique helps to control endogeneity from self-selection. Then, the first dependent variable used in this model is *acquisition premium*, which is calculated as the

percentage difference between the final price paid and target's stock price one week and four weeks before the merger and acquisition (M&A) announcement. With these two variables I effectively capture the difference in prices before and after the treatment. In addition, these two measurements for acquisition premiums are considered adequate in the literature (Beckman & Haunschild, 2002; Hayward & Hambrick, 1997; Laamanen, 2007) because they capture the acquisition premium, which is the excess of value that the acquirer is willing to pay for the M&A. In this case, using the two measurements also provides robustness to the results because both measurements are seen by researchers as competitive from an empiric point of view. For example, Laamanen (2007) considers that measuring the price change one week before the announcement is a superior measurement because of the potential introduction of noise when using the four-week measurement. In this paper I do not engage in such a debate, but the results do not show a clear evidence of such a problem, and I use both measurements to provide certainty to the conclusions.

The second explanatory variable that I use is the change in return on assets (*Change in ROA*). The ROA is calculated by the total income divided by one period of lagged total assets. Then, I capture ROA the year after the acquisition and compare these values to the ROA one year prior to the announcement. Using such a measure isolates management performance from market valuation. This study's research question asks if firm performance may be improved by acquiring a company from a management perspective, and which conditions are predictors of that improvement; this paper does not address shareholder performance/returns. The question addresses the managerial perspective of whether firms perform better or worse after an acquisition. From this

perspective, ROA is also popular in accounting (Richard, Devinney, Yip, & Johnson, 2009) because its better captures managers' capability to generate income. From a different perspective, if the manager increases the firm's income more than the increase in the firm's assets, performance may be associated with better management. In addition, ROA also comprehends measuring primary stakeholders' interests, such as buyers and customers (Coff, 1999b) including more legitimate stakeholders, such as managers (see Clarkson, 1995)—the center of this paper's questions.

Treatments Variables

In difference and differences analysis, instead of defining independent variables, one defines treatments. For example, difference and differences may help understand whether having, or not, a free lunch at the school increases the students' grades. The method consists of comparing the students that have had lunch with the ones that did not (also using propensity scores, which I explain below as "controls"). In a similar way, the treatment may be interpreted as a subject exposed or having been part of any specific event, which in the case of this paper refers to a firm citing or having been cited by other firms.

Recalling that the central argument is that the potential synergistic resources in an interfirm relationship are better used—and better forecasted—when managers possess sufficient knowledge (Borys & Jemison, 1989; Datta & Grant, 1990). This argument requires measuring managers' understanding of the other firm's business, as well as the awareness of the other firm's resources, but as the model indicates, it has to be done at a transactional level and in a non-symmetrical way. When observing each transaction—

M&A, I capture each firm knowledge about the other, which is non-symmetric between the acquirer and the target. Then, is important to have access to measurements capturing "how much one firm knows about the other"—treatments that I designated as *Acquirer-citing*, *Target-citing*, and *cross-citation*. I use patents because they are a good measurement of a firm's valuable resources; and, compared to R&D expenditures (which I later use as controls), patents are a more precise measurement of a firm's technological resources (Silverman, 1999). Further, citations are a foot print that permits to follow and understand how knowledge spills over (Henderson, Jeffe & Trajtenberg, 1993; Jeffe & Trajtenberg, 1998) and to measure the stock of knowledge (Decarolis & Deeds, 1999). In addition, patents citation indicates the market's awareness of the value of the firm, but also indicates the scope and potential applicability of the other firm's resource because "the more frequently a certain patent is cited by subsequent patents, the more the related technology" (Chang, Lai, & Chang, 2009, p. 107). Then, when a firm, in its own patenting process, cites another firm's patents, it shows a "private" understanding about the other firm's resources and the potential overlap (Cotropia, 2009), or synergies with its own firm's resources. Then, this measurement also reflects asymmetries in managers' awareness about the synergies with the other firm's resources, which is essential to capture a bilateral dynamic. For example, if the acquirer had cited the target's patents, the acquirer has an awareness and potential understanding about the interfirm synergies, which I coded as a treatment.

For the second set of hypotheses, I also included the *acquisition premium,* that was the dependent variable, as an independent variable, with the intention of having the propensity score of that variable over the complete M&A sample when predicting the

changes in ROA. Simply, in the difference in differences I correct the sample for the size of the premium paid before calculating the change in ROA. Thus, the results to estimate firms' performance after the acquisition also account for the size of the acquisition paid in both groups.

Propensity variables (controls) and potential alternative explanations

The interpretation for control variables is different when considering that the paper uses a difference in differences methodology. In this case, the controls are used primarily to measure how the group of treated firms may differ from the group of not treated firms. These differences are "corrected" using the significant propensity scores. In essence a difference in differences is a linear model corrected using the propensity scores. Then, I account for several variables that are recognized in the literature as correlated to the premium's size, as well as for post-acquisition performance. For example, it is important to account for ex-ante *target's shareholder return* because that variable has a persistent performance effect on the acquisition returns (Hayward and Hambrick, 1997). Simply, if a firm has been doing well before being bought by the acquirer, "inertia" could potentially positively affect the acquirer's post-acquisition performance. In addition, post-acquisition returns may be affected, for example, by the amount of capital available to be redeployed in the new firm (Slusky & Caves, 1991). Although capital is a valuable resource for a firm, it does not reflect any knowledge advantage that might permit managers to extract value from potential synergies. Indeed, having additional capital may occur because the acquirer's manager increased the firm's debt, increasing the money available to be redeployed over the acquired firm. Then, I used the acquirer's *Cash* and

Net asset to net debt ratio to capture its available "disposable" capital (Hayward & Hambrick, 1997), but in relation to the firm's debt. I also included relatedness to the propensity score correction. When referring to potential synergies, scholars from different traditions or approaches confidently use relatedness (e.g. Hayward & Hambrick, 1997; King *et al.*, 2004; Kusewitt, 1985; Palich, Cardinal, & Miller, 2000; Rumelt, 1974; Sakhartov & Folta, 2014; Sirower, 1997; Villalonga & McGahan, 2005). Relatedness is usually collected by using the Standard Industrial Classification (SIC) codes (Fan & Lang, 2000). In this case, I coded as 1 the condition where the target and the acquirer share the *Same-Industry*, and 0 if they do not. Then, the acquirer and the target share the same exact industry if they have the exact same ultimate three SIC code digits. This binary approach permits capturing differences between the treatment and the control group in terms of whether the firms are effectively participating in the same industry and the manager's understanding of it. Note, that I am intentionally not using relatedness to avoid the limitations that SIC codes have when measuring the potential relatedness distance with other firms (Lien & Klein, 2010).

Variables relating to market competition help in predicting post-acquisition performance. Firm size, whether combined or separate, may also have an effect on performance. In this case I used the number of employees for each firm, *TgNumberofEmployees* and *AcqNumberofEmployees.* I intentionally excluded sales to avoid high correlations with the ROA, and also because sometimes firms that are part of a corporate entity have interfirm transference prices that may blur the analysis. Because the accumulated knowledge is important (Nelson & Winter, 1982), I also controlled for firms' previous experience acquiring another company, which I designated as

PriorMAExp. There is evidence that the acquirer's experience may have an effect on subsequent acquisitions premiums (Kim, Haleblian, & Finkelstein, 2011) and post-acquisition performance (Amburgey & Miner, 1992; Haleblian, Kim, & Rajagopalan, 2006). In addition, given that the data would be spread over a large time window, I also control for explanatory power resulting from *Time-effect*. Over the years firms have not been merging and acquiring other firms in a constant rate (Ahern & Harford, 2014), which affects the number of M&A's that occur as well as the amount of dollars involved in them. The acquisitions that occurred, for example, during the year 1990, may have been priced in a different context than the ones that occurred during the year 2000. Then, I calculated the propensity scores considering a factor from the years 1990 to 2006. In a similar way, I used the same factor to account for systemic economic situation that may affect post-acquisition ROA. I also controlled for variables such as the number of bidders, which may positively affect the acquisition premium (Flanagan and O'Shaughnessy, 2003) due to excess of demand for the target. Similarly, I also controlled for poison pills because they make the acquisition excessively expensive (Comment & Schwert, 1995). Finally, I also controlled for Cash tender offers because they are more likely to sweeten the deal until completion (Hoffmeister and Dyl, 1981), which may imply an increased premium.

RESULTS

The results shown in Table 1 and Table 2 provide substantial support to the main theory; the premium and post-acquisition performance are strongly related with ex-ante acquisition inter-firm asymmetric/symmetric citation. The idea of rents from knowledge

asymmetries between firms (Coff, 1999) holds when considering patent citation as a measurement of managers' awareness of potential valuable resource complementarity and synergies.

Insert Table 1 about here

Table 1 contains eight models for each of the six treatments when predicting the acquisition premium. The models on the left side of the Table 1 include the year of the announcement as part of the correction in the match function—model 1 to 4. This time control, along with the propensity variables described above , are included to calculate correction that may differ between the treated and not treated group. The difference between the model 1 and 2 compared to model 3 and 4 is that in the last two the differences between treatment and control include only the year control and not the rest of the variables, such as if they share the same industry, acquirer's amount of cash, etc. The right side of Table 1 contains model 5 to 8 and follows the same logic as the left side, with the only difference than instead of year by year control it considere M&A waves. Then, the M&A events are grouped considering 1 when the total acquisition start to decline while the total dollar value of mergers increased substantially (see Ahern & Harford, 2014), and 0 when that pricing phenomenon was not present.

I found partial support for H1a in the sense that only model five indicates that when the acquirer is the one that cited the target, but the target had not cited the acquirer, the premium tends to be larger by a 11%—the column DD (ATT) with value 10.995). Despite being the only model having significance, when reviewing the size of the effect and the standard deviation (SD), the P-Value is significant with a value around 1%.

Because difference in differences between treated groups that are small versus untreated large samples may induce to a type II error (see Bertrand, Duflo, & Mullainathan, 2004), I limit my claims of significance to P-Values not larger than a 5%. However, I also commented or assigned relative significance when the P-Values are slightly higher than 5%, but present in several models. For example, model 6 shows a P-Value around the 6% for the same case where the only party citing was the acquirer. I interpreted the results of? model 5 and 6 as a strong evidence that a correlation exists between the acquirer citing the target's patents and the premium. This result is consistent with the claim that when a patent is cited, the acquirer believes that the value of such a resource is greater (Grimpe & Hussinger, 2014; Hall, Jaffe, & Trajtenberg, 2005), but assumes the extra value results from the acquirer's understanding of his or her private synergies (Barney, 1988). For H1b I did not find support for the treatment *OnlyTargetCitedTheAcq*. There are three models showing that when the target had cited the acquirer, but not excluding that the acquirer may have done citations of the target's patents (*TargetHadCitedAcq*), the value of the premium is smaller by around 6% (-6.0487) in model 6, -3.5% (-3.4507) in model 7, and 3.4% (-3.3968) in model 8. Only model 6 showed clear significance with a P-Value below 0.3% (0.002774). As mentioned, t this variable includes situations where the acquirer also cited the target, so I declared that H1b does not have sufficient evidence to claim support.

The strongest support in this paper is found in H1c, where I claim that *Cross-Citation* between the acquirer and the target reduces the acquisition premium. This finding makes reasonablethe relevance for bilateral perspective research in strategic phenomena that involve transactions with two or more parties involved (see Grove, Fox

& Souder, 2017). From the perspective of significance and size effect, *Cross-Citation* resulted significantly below 5% level in three of the eight models—models 1,3 and 7—and significantly below the 2% P-Value in model 2. The effect size in this case goes from a lower premium around -4.7% to a maximum of -6.15%. It is salient that the maximum reduction in the premium achieved the value -6.15% (-6.1519) in model 2 with small standard errors and a P-Value below 2% (0.016145). Models 5 and 6 add also partial evidence, in that they also show a large decrease in the premium paid—around 5%--, but with standard errors not small enough to meet the 5% significance boundary. However, following the process that I proposed for claiming evidence, significance slightly above 5% are taken as evidence to support the hypothesis when such finding is an addition to prior findings with P-Values below the 5%.

Insert Table 2 about here

Table 2 has a similar structure as Table 1, with the only variant that the treatment group and the control sample are now predicting differences on post-acquisition change in ROA. Change in ROA captures managers' capability to generate income considering the firm's resources are limited, which is the case of materializing synergies from valuable and scarce resources stemming from the target. In the previous set of hypotheses, I tested the claim that maybe "Manager do not know what they are buying." Now, the second set of hypotheses attempts to test that this lack of knowledge shows up as an impediment to the acquirer's managers obtaining high performance—a limitation that exists because successful value extraction can happen only when managers have

sufficient knowledge about the target's business (Borys & Jemison, 1989; Datta & Grant, 1990). In the case of Table 2, there is strong evidence only for H2b where seven of the eight models showed significance. I considered two kind of treatments *TargetHadCitedAcq* and *OnlyTargetCitedTheAcq* to claim support for H2b. As mentioned before the treatment *TargetHadCitedAcq* has the limitation that may involve situations where the acquirer did also cite the target patents. Then, I analyzed the result from *TargetHadCitedAcq* considering also the results from the treatment *OnlyTargetCitedTheAcq*. For the case of *TargetHadCitedAcq,* model 11,12,14,15,16 show a difference in change in ROA between the treatment and the control group of around 0.2—for example, model 11 shows a -0.21028 DD (ATT) —with small SD that provide P-Values below the 5% threshold in this paper. The magnitude of the difference between the treatment and the control group is small, considering that the total sample standard deviation is 1.05 for the Change in ROA.

When *OnlyTargetCitedTheAcq* the magnitude of the effects is also around the same value of 0.2, but the standard deviations are larger, which does not satisfy the boundary of P-Values below 5%. However, the P-Values for *OnlyTargetCitedTheAcq* are close from the 5% boundary, and in one case, model 13, if this research would present P-Values with only the decimal point, the mean effect would be significant on a 5% level. As I did in the first set of hypotheses, these P-Values are interpreted as providing support when there is previous evidence of it, which is the case of the treatment *TargetHadCitedAcq*. One of the reasons for not having the desirable small standard deviations is that the treatment sample for *OnlyTargetCitedTheAcq* is only made of twenty-two cases. The same explanatory power that I identify in *OnlyTargetCitedTheAcq* may be present for when

OnlyAcqCitedTheTarget because the treated group is only fifteen cases. It is observable over all the models in Table 2, that when the acquirer is the one that cited the target, the change in ROA tends to be positive. However, we find no evidence sufficiently robust to claim significance for the effect of *OnlyAcqCitedTheTarget*. Finally, for robustness and to discard the alternative explanation that it may be the case that firms that cite or are cited may strongly differ in the sample, I controlled for any kind of citation. This treatment is applied to both tables, and there is no model showing significance inside the threshold of 5% for the treatment named *AnyCitation*.

Discussion and conclusion

In a recent piece Feldman (2019) highlighted the need for a dyadic or bilateral approach to specific corporate strategies like mergers and acquisition. She argued that the obviousness of the approach does not match the small amount and insufficient research that considers such competitive dynamics within counterparties. For the case of acquisition premiums, the obviousness claim gains inertia to the point of being unrealistic when not considering both sides bargaining—the target and the acquirer. Regardless of the form the bargaining process takes, a price closes a transaction when one side, the seller, believes that the value of the good is lower than the price that it is requesting, and, at the same time, the buyer perceives the value as higher than the price it will pay. This paper's results support the main theory and the relevance of a bilateral research perspective. Thus, considering the acquisition as a bilateral transaction seems to be useful and important. As mentioned before, it is unrealistic to not consider that the target has incentives to push the price upwards while the acquirer advocates paying as low a price as possible. One side sells when his or her expectations are that the value of their asset is

lower than the price paid by the buyer. Similarly, the buyer buys when his or her expectations are that the value of the asset exceeds the price. The data consistently shows that when defining the premium, firms' managers leverage what they know and learn to bargain (Williamson, 1975) over the price—the acquisition premium. Therefore, when the acquirer cites the target and shares the same industry, his or her control of the target's managers' opportunism reduces the premium paid. The acquirer's citation of the target shows that the acquirer's managers possesses an understanding about valuable resource complementarities, and sharing the same industry dissipates the potential pitfalls that a newcomer to the industry would face.

Other variables such as relatedness–the target and the acquirer in the same industry—are insufficient to measure asymmetries in corporate strategies that are somehow a transaction. For example, researchers had explained the premium by operationalizing the acquirer's relatedness to the target (Flanagan, 1996; Matsusaka, 1993; Singh & Montgomery, 1987). This line of research is valuable in the sense that they capture the acquirer's managers' willingness to pay a premium for eventual synergies, but they neglect, or at least underestimate, that the acquisition is a transaction itself, and that relatedness is not a good instrument to capture bargaining asymmetries. Relatedness as it is often used is an industry-level variable, is usually collected by using the SIC codes (Fan & Lang, 2000). The problem is that, in the case of an acquisition, the phenomenon is a two-sided transaction, and the target and the acquirer do not always have the same level of understanding of each other's business. Therefore, a framework such as the one proposed by Grove, Fox and Souder (2017) gains relevance when considering that firms will leverage knowledge to capture a larger portion of value from

the transaction. This framework, the Coordination Equilibrium, may be useful in situations where value creation results from events that show high levels of friction, to the point where one party needs to buy the other to materialize the value creation opportunity.

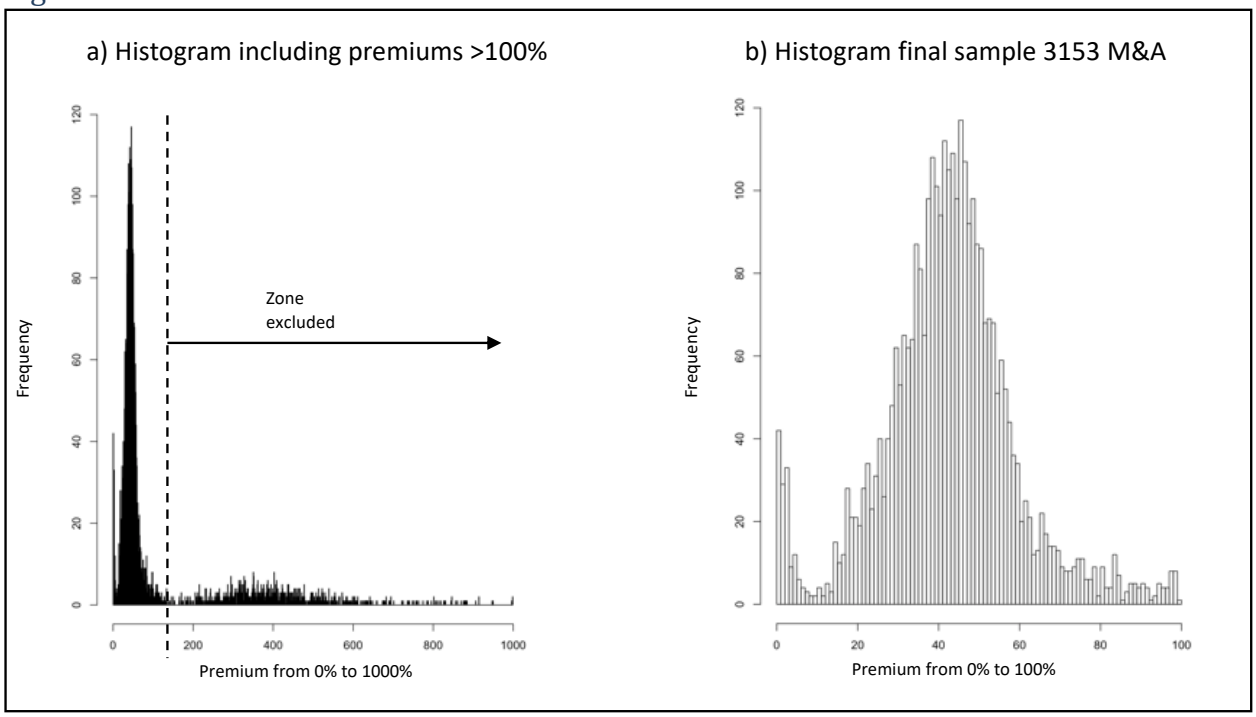
This paper is aligned with the few researchers that consider counterparties characteristic in post-acquisition performance (i.e. Feldman, Amit, & Villalonga, 2019). However, I propose a bilateral, instead of Feldman's (2019) dyadic analysis, in the sense that when observing transactions, I consider the bilateral bargaining dynamic between the parties and not only the dyadic nature of how each one differs from the other. A substantial amount of theory in strategy research relies on firms' and/or managers' opportunism (e.g Transaction Cost Economics); firms learn from each other and leverage such knowledge in the transactions with other firms with the objective of capturing a larger value. For example, I propose that alliance literature may incorporate the bilateral perspective. However, when using a bilateral approach, the alliances' cooperative-learning environment (e.g. Lane et al., 2001; Oxley et al., 2009) falls short of reality. The alliance formation, governance, stability, and value sharing will depend on firms' bargaining strength to bring and capture value to the relationship. Then, variables such as firm-alliance relatedness, defined as the distance between the firm and the alliance SIC codes, may be relevant to understand the how much value each firm may capture, and how explorative or exploitative the alliance is for each single party.

From a post acquisition performance perspective, the results show that acquisitions are not necessarily detrimental when firms have a realistic resource complementarity. Considering Laamanen's (2007) explanation of the premium, the

effective synergic potential defines the real value that the acquisition may produce. The results showed that when the acquirer does not know how the resources may be complementary, post-acquisition performance is poorer compare to the other acquisitions. Thereafter, lack of knowledge limits the transfer of economic rents from the target's resources (Itami & Roehl, 1987) and accentuates complexities about the potential resource complementarity (Chen, Meng, & Li, 2017) that are supposed to create synergistic value. Given that evidence shows that, in general, post-acquisition performance is usually poor (Chatterjee, 1986; King *et al.*, 2004; Moeller, *et al.*, 2003), one may be tempted to think that managers may be acquiring "lemons." Instead, this paper shows that larger premiums and deficient post-acquisition performance result when managers simply do not know what they are buying.

FIGURES SECOND PAPER

Figure 1



TABLES SECOND PAPER

Table 1

Model 1

Premium 1 Week before announcement controling by year announced

Treatment	N of M&A	DD (ATT)	SD	T-statistic	P-Value
AcqHadCitedTarget	61	-2.335	2.6758	-0.87264	0.3829
OnlyAcqCitedTheTarget	15	6.0273	6.0034	1.004	0.3154
TargetHadCitedAcq	70	-2.69	2.148	-1.2523	0.2105
OnlyTargetCitedTheAcq	24	-0.0366	2.8886	-0.01268	0.9899
Cross-Citation	46	-4.7026	2.3862	-1.9708	0.0488
AnyCitation (Control)	85	-0.4863	1.9433	-0.25026	0.8024
	n=3153				

Model 2

Premium 4 Weeks before announcement controling by year announced

Treatment	N of M&A	DD (ATT)	SD	T-statistic	P-Value
AcqHadCitedTarget	61	-1.9048	2.2899	-0.8318	0.4055
OnlyAcqCitedTheTarget	15	1.0243	4.8217	0.21243	0.8318
TargetHadCitedAcq	70	-2.5027	2.3168	-1.0802	0.28
OnlyTargetCitedTheAcq	24	-1.3762	2.8526	-0.48245	0.6295
Cross-Citation	46	-6.1519	2.5573	-2.4056	0.0161
AnyCitation (Control)	85	0.29358	1.9953	0.14713	0.883
	n=3150				

Model 3

Premium 1 Week before announcement only controling by year announced

Treatment	N of M&A	DD (ATT)	SD	T-statistic	P-Value
AcqHadCitedTarget	61	-2.1516	2.1677	-0.99259	0.3209
OnlyAcqCitedTheTarget	15	5.7543	4.2049	1.3685	0.1712
TargetHadCitedAcq	70	-3.0407	1.9288	-1.5765	0.1149
OnlyTargetCitedTheAcq	24	0.25703	3.0507	0.084254	0.9329
Cross-Citation	46	-4.7379	2.4025	-1.9721	0.0486
AnyCitation (Control)	85	-1.4838	1.7939	-0.82715	0.4082
	n=3153				

Model 4

Premium 4 Weeks before announcement only controling by year announced

Treatment	N of M&A	DD (ATT)	SD	T-statistic	P-Value
AcqHadCitedTarget	58	-2.0842	2.1238	-0.98135	0.3264
OnlyAcqCitedTheTarget	14	2.7004	3.27	0.82581	0.4089
TargetHadCitedAcq	66	-2.8157	2.0252	-1.3903	0.1644
OnlyTargetCitedTheAcq	22	-1.2014	3.1989	-0.37556	0.7072
Cross-Citation	44	-3.5977	2.5531	-1.4092	0.1588
AnyCitation (Control)	80	-1.8559	1.7878	-1.0381	0.2993
	n=3150				

Model 5

Premium 1 Week before announcement controling by wave

Treatment	N of M&A	DD (ATT)	SD	T-statistic	P-Value
AcqHadCitedTarget	61	-2.02	2.3512	-0.85914	0.3903
OnlyAcqCitedTheTarget	15	10.995	4.5992	2.3907	0.0168
TargetHadCitedAcq	70	-1.5825	2.212	-0.71542	0.4744
OnlyTargetCitedTheAcq	24	-0.1893	2.9864	-0.06338	0.9495
Cross-Citation	46	-5.0512	2.8322	-1.7835	0.0745
AnyCitation (Control)	85	-1.4417	2.0309	-0.7099	0.4778
	n=3153				

Model 6

Premium 4 Weeks before announcement controling by wave

Treatment	N of M&A	DD (ATT)	SD	T-statistic	P-Value
AcqHadCitedTarget	61	-1.4459	2.9215	-0.49491	0.6207
OnlyAcqCitedTheTarget	15	7.8715	4.2927	1.8337	0.0667
TargetHadCitedAcq	70	-6.0487	2.0218	-2.9917	0.0028
OnlyTargetCitedTheAcq	24	-1.4459	2.9215	-0.49491	0.6207
Cross-Citation	46	-5.1887	2.7409	-1.893	0.0584
AnyCitation (Control)	85	-2.0849	2.2531	-0.92535	0.3548
	n=3150				

Model 7

Premium 1 Week before announcement only controling by wave

Treatment	N of M&A	DD (ATT)	SD	T-statistic	P-Value
AcqHadCitedTarget	61	-2.2268	2.1517	-1.0349	0.3007
OnlyAcqCitedTheTarget	15	6.5635	4.0333	1.6273	0.1037
TargetHadCitedAcq	70	-3.4507	1.8918	-1.824	0.0682
OnlyTargetCitedTheAcq	24	-0.1887	2.966	-0.06363	0.9493
Cross-Citation	46	-5.1017	2.375	-2.1481	0.0317
AnyCitation (Control)	85	-1.6697	1.768	-0.94444	0.345
	n=3153				

Model 8

Premium 4 Weeks before announcement only controling by wave

Treatment	N of M&A	DD (ATT)	SD	T-statistic	P-Value
AcqHadCitedTarget	61	-1.8224	2.1482	-0.84835	0.3962
OnlyAcqCitedTheTarget	15	5.7761	3.8227	1.511	0.1308
TargetHadCitedAcq	70	-3.3968	1.8973	-1.7904	0.0734
OnlyTargetCitedTheAcq	24	-1.5485	2.8659	-0.54033	0.589
Cross-Citation	46	-4.3098	2.4432	-1.764	0.0777
AnyCitation (Control)	85	-1.7664	1.7496	-1.0096	0.3127
	n=3150				

Table 2

Model 9

Change ROA using premium 1 Week before as independent variable and also controling by year announced

Treatment	N of M&A	DD (ATT)	SD	T-statistic	P-Value
AcqHadCitedTarget	58	0.07807	0.15	0.5206	0.6027
OnlyAcqCitedTheTarget	14	0.18357	0.2971	0.61794	0.5366
TargetHadCitedAcq	66	-0.2455	0.1467	-1.6733	0.0943
OnlyTargetCitedTheAcq	22	-0.2177	0.1461	-1.4904	0.1361
Cross-Citation	44	-0.1046	0.184	-0.56858	0.5696
AnyCitation (Control)	80	-1.2967	1.9308	-0.67156	0.5019
	n=2606				

Model 10

Change ROA using premium 4 Week before as independent variable and also controling by year announced

Treatment	N of M&A	DD (ATT)	SD	T-statistic	P-Value
AcqHadCitedTarget	58	-0.0869	0.1969	-0.44115	0.6591
OnlyAcqCitedTheTarget	14	0.16361	0.2925	0.55933	0.5759
TargetHadCitedAcq	66	-0.1305	0.1373	-0.951	0.3416
OnlyTargetCitedTheAcq	22	-0.2158	0.146	-1.4784	0.1393
Cross-Citation	44	-0.0344	0.1851	-0.1859	0.8525
AnyCitation (Control)	80	-0.1183	0.1285	-0.92027	0.3574
	n=2601				

Model 11

Change ROA only controling by year announced and the sample considers the premium 1 week before

Treatment	N of M&A	DD (ATT)	SD	T-statistic	P-Value
AcqHadCitedTarget	58	-0.1221	0.1177	-1.037	0.2997
OnlyAcqCitedTheTarget	14	0.12702	0.2157	0.589	0.5559
TargetHadCitedAcq	66	-0.2103	0.1047	-2.0077	0.0447
OnlyTargetCitedTheAcq	22	-0.2238	0.151	-1.4818	0.1384
Cross-Citation	44	-0.1984	0.1357	-1.4619	0.1438
AnyCitation (Control)	80	-0.1531	0.096	-1.5948	0.1108
	n=2606				

Model 12

Change ROA only controling by year announced and the sample considers the premium 4 week before

Treatment	N of M&A	DD (ATT)	SD	T-statistic	P-Value
AcqHadCitedTarget	58	-0.1183	0.1176	-1.0059	0.3145
OnlyAcqCitedTheTarget	14	0.13293	0.2153	0.61736	0.537
TargetHadCitedAcq	66	-0.2074	0.1046	-1.9833	0.0473
OnlyTargetCitedTheAcq	14	0.13293	0.2153	0.61736	0.537
Cross-Citation	44	-0.1953	0.1355	-1.4412	0.1495
AnyCitation (Control)	80	-0.1497	0.0959	-1.5611	0.1185
	n=2601				

Model 13

Change ROA using premium 1 Week before as independent variable and also controling by wave

Treatment	Number o	DD (ATT)	SD	T-statistic	P-Value
AcqHadCitedTarget	58	0.04061	0.16	0.25375	0.7997
OnlyAcqCitedTheTarget	14	0.35625	0.346	1.0297	0.3031
TargetHadCitedAcq	66	-0.2114	0.1236	-1.7106	0.0872
OnlyTargetCitedTheAcq	22	-0.2821	0.1458	-1.9345	0.0531
Cross-Citation	44	-0.2885	0.1701	-1.6957	0.0899
AnyCitation (Control)	80	-0.2137	0.1253	-1.706	0.088
	n=2601				

Model 14

Change ROA using premium 4 Week before as independent variable and also controling by wave

Treatment	Number o	DD (ATT)	SD	T-statistic	P-Value
AcqHadCitedTarget	58	-0.0399	0.169	-0.23605	0.8134
OnlyAcqCitedTheTarget	14	0.43231	0.2979	1.4512	0.1467
TargetHadCitedAcq	66	-0.2552	0.1224	-2.0857	0.037
OnlyTargetCitedTheAcq	22	-0.278	0.1459	-1.9051	0.0568
Cross-Citation	44	-0.2947	0.181	-1.6283	0.1035
AnyCitation (Control)	80	-0.1686	0.1248	-1.3514	0.1766
	n=2601				

Model 15

Change ROA only controling by wave and the sample consider the premium 1 week before

Treatment	Number o	DD (ATT)	SD	T-statistic	P-Value
AcqHadCitedTarget	58	-0.1255	0.1204	-1.0423	0.2973
OnlyAcqCitedTheTarget	14	0.10371	0.2054	0.50495	0.6136
TargetHadCitedAcq	66	-0.2218	0.1067	-2.08	0.0375
OnlyTargetCitedTheAcq	22	-0.2616	0.1412	-1.8531	0.0639
Cross-Citation	44	-0.1974	0.1421	-1.3898	0.1646
AnyCitation (Control)	80	-0.1658	0.0966	-1.7165	0.0861
	n=2606				

Model 16

Change ROA only controling by wave and the sample consider the premium 4 week before

Treatment	Number o	DD (ATT)	SD	T-statistic	P-Value
AcqHadCitedTarget	58	-0.1207	0.1204	-1.0027	0.316
OnlyAcqCitedTheTarget	14	0.10824	0.2053	0.52728	0.598
TargetHadCitedAcq	66	-0.217	0.1067	-2.0345	0.0419
OnlyTargetCitedTheAcq	22	-0.2568	0.1411	-1.8193	0.0689
Cross-Citation	44	-0.1926	0.1421	-1.3561	0.1751
AnyCitation (Control)	80	-0.161	0.0966	-1.6666	0.0956
	n=2601				

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DOES ACQUIRER CEO HUBRIS REALLY MATTER? A TWO-SIDED PERSPECTIVE FOR PREMIUMS

ABSTRACT

An acquisition is a price equilibrium reached by two (or more) parties. One side sells when their expectations are that the value of their asset is lower than the price paid by the buyer. Similarly, the buyers buy when their expectations are that the value of the asset exceeds the price. In this paper, I argue that seller and buyer—acquirer and target—both make judgements about an "acceptable" acquisition premium, but those judgements are certainly affected by the hubris of both sides' CEOs. This bilateral perspective is usually not factored in by strategy research literature. With a sample of 233 non-hostile mergers and acquisitions (M&A) between 2012 and 2016, this study modeled and tested that the likelihood of completing an acquisition and its premiums is explained by both CEOs' confidence and decision-making resolution. Further, it found evidence that supports the claim that the acquirer CEO's overconfidence does not "really matter" to explain the premium paid; the target's CEO is the one that resolves this bargaining dynamic by predicting the final premium paid.

INTRODUCTION

I observe that research in M&A, and the pricing for acquiring the other company, are usually reviewed in a one-sided simplified manner that does not necessarily reflect the two-sided reality of a transaction (Feldman, 2020). In this paper, I propose a dynamic, where the acquirer proposes the deal, but the target has the last word about the conformity with the premium that closes the strategic transaction.

A case of a myopic one-sided perspective is found in research related to exacerbated overconfident managers, also known as hubris. Overconfident managers do not only overestimate their capability to extract value from their strategic choice (i.e. Bollaert and Petit, 2010); they also seem to pay higher acquisition premiums (Hayward and Hambrick, 1997). Further, overconfident managers also have a judgement problem regarding the firm that they manage because they perceive their firms as undervalued by the market (Malmendier, Tate and Yan, 2011). However, existing theoretical streams regarding M&As focus almost exclusively on the one-sided perspective (Feldman, 2020) of the acquirer CEOs overconfidence.

For example, Hayward and Hambrick (1997) showed that when there is a lack of board monitoring, the acquirer CEO's hubris is a good predictor of higher acquisition premiums. Despite a few salient exceptions in post M&A literature performance (i.e. Liu, Taffler and John, 2009), scholars do not necessarily consider that the target's CEO may also suffer from overconfidence, and the self-perceived undervaluation found by Malmendier et al. (2011) potentially also applies to the target's CEO. The mechanism is simple: if the target CEOs suffer from hubris, their belief is that the stock price is low compared to its "true value" perception. The target CEOs perceive the acquisition

premium as lower because they already perceive the standalone price to be higher, putting upward pressure on the acquisition premium that may effectively prevent the transaction.

From a strategic transactional perspective (Feldman, 2020) in the real world, the target firm "exists" and the target's perception of the price should be accounted for to explain the acquisition pricing mechanism. Simply, when one firm is buying, a second firm accepting the price is required to complete the transaction. A real world example for this target's CEO's value perception for a M&A was in 2008, when Microsoft's CEO, Steve Ballmer, attempted to acquire Yahoo to have a better chance of competing with the internet search engine industry leader, Google (Rivkin and Van den Steen, 2008). However, despite an offered premium of 62%, Yahoo's CEO, Jerry Yang, turned down the friendly proposition under the premise that the premium was much lower than his belief about Yahoo's potential valuation as a standalone firm. This Microsoft-Yahoo anecdotal situation exhibits the importance of recognizing that the target also makes judgments about the size of an "acceptable" acquisition premium: a price that closes the transaction. Furthermore, market gossips suggested that Yahoo was expecting around $40 per share instead than the $31 offered (Pimentel, 2008).

In this paper, I modeled and tested that this two-sided overconfident perspective is important when reviewing acquisition premiums. In addition, when referring to CEO exacerbated overconfidence, relevant literature does not provide a baseline for claiming overconfidence. For example, there is mixed evidence that managerial confidence is expected and desirable in terms of firm performance (Han, Lai and Ho, 2015). Intuition suggests that CEOs from any given firm probably require a "healthy" dose of confidence

to lead a firm, and perhaps some "extra" to execute a M&A. Analyzing M&A from both CEOs' perspectives will also provide grounds to compare the levels of confidence between acquirers and targets. If the acquisition premium is better explained by the target CEO's overconfidence, then it may be the case that the acquirer's overconfidence found by many researchers to explain acquisition premiums is not more than the "healthy" dose of overconfidence that motivates (James, 1890) the acquirers to move forward. Then, higher premiums are a response to the acquirers being required to pay a satisfactory price from the target's perspective, a simple winner's curse.

This study's contribution is to present a much more realistic bargaining explanation and mechanism for acquisition premiums, since omitting that both target's and acquirer's managers bargain driven by satisfaction-seeking behaviors (e.g., Cyert and March, 1963; Greve, 1998; Simon, 1945) hinders the two-sided nature of a strategic transaction (Feldman, 2020). In addition, research indicates overconfidence is mostly correlated to negative outcomes (see Picone, Giovanni and Minà, 2014). In this study I provide a more nuanced perspective about CEO's overconfidence and M&A. Finally, I use an overconfidence measurement that is more direct, symptomatic and pragmatic compared to the field. This measurement improvement is needed because, so far, the validity of the proxies is widely criticized (Abernethy and Wallis, 2018).

THEORY AND HYPOTHESES

Relevant literature suggests that managers, as a broad subject of analysis, are more confident than the average person due to self-selection because people that attempt to lead seem to have the belief that they would do it better than others (i.e. Kaplan,

Klebanov and Sorensen, 2012). In addition, specifically from a CEO perspective, individual characteristics and abilities are perceived by researchers as important in firm performance (Gabaix and Landier, 2008; Murphy and Zabojnik, 2004), as well as the level of resolution or confidence to take strategic actions (Kaplan, Klebanov and Sorensen, 2012). Further, confidence is expected and wanted from a CEO because it is a position that requires the person to impose their will on other managers as well when facing a decision making-situation (Haleblian and Finkelstein, 1993).

However, when referring to M&A, the researchers' trend is that overconfidence is a failure (Picone, Giovanni and Minà, 2014), but without the understanding of what is overconfidence and what is confidence. The problem with the confidence construct is that the level of such a characteristic may constitute a blessing or a curse, and it is difficult to address how much is too much, such as in a more philosophical question like what is cold and what is hot. This is the case of confidence versus overconfidence; while confidence may be seen as a person's positive perspective about the future, overconfidence may be seen as a distorted and unfounded positivism about future outcomes (Liu, Taffler and John, 2009). From this perspective, one may claim that the level of confidence expressed as positive expectations about the future is a common and desirable characteristic among CEOs.

However, when researchers perceive CEO confidence as overconfidence, they couple that exacerbated optimism with expected negative outcomes, like overvaluation of the target. For example, Liu, Taffler and John (2009) found evidence that acquirer CEOs show higher levels of overconfidence compared to other CEOs in the S&P 500. They measured exacerbated positivism from CEOs and showed that in the short term, it is

usually paired with poor post-acquisition cumulative abnormal returns (3-day window surrounding the announcement date). Further, they found similar results for cumulative abnormal returns when both CEOs, the target and the acquirer, suffered from exacerbated positivism.

Despite this bilateral evidence and the finding suggesting that, on average, the acquirer CEOs seem to be more overconfident than other CEOs, there is still no clarity on what constitutes healthy levels of confidence versus overconfidence, and the subsequent effects on the acquisition premium. For instance, relevant literature associates overconfidence with the premium and not with the possibility that just confidence alone may be what differentiates the acquirer from the target. From a different perspective, confidence enhances the motivation to take action (James, 1890); the lack of it is not only related to inaction (Bénabou and Tirole, 2002), but is also paired with ex-post failure (Salancik, 1977). This relationship between confidence, taking action and increased odds of success suggests that confidence is important in a CEO position.

Further, there is evidence that confident CEOs are more likely to perceive opportunities and take action on them faster than managers that are not confident (Hiller and Hambrick, 2005). Because acquirer CEOs are more confident than other CEOs (i.e. Liu, Taffler and John, 2009) one expects that acquirer CEOs show a pattern of a larger amount of positivism compare to targets, in the sense that acquisitions are the result of the acquirers' higher levels of positivism compare to the targets' levels of positivism.

H1: Acquirers' CEOs show higher levels of positivism compared to the target CEOs.

The difference between the standalone valuation and the price paid by the acquirer is the "acquisition premium". According to seminal literature, this premium is explained by the market's acknowledgment of a potential increase in value for both firms standing together and coordinating their resources (Crawford and Lechner, 1996; Laamanen, 2007). Scholars have approached acquisition premiums from many perspectives, such as (a) asymmetric information between the parties that makes it difficult for the acquirer to price the target (Balakrishnan and Koza, 1993; Hennart and Reddy, 2000); (b) situations in which demand and offer may be price-conductive, such as economic equilibrium and other structural determinants based on antitakeover strategies (such as poison pills), which affect the acquisition premiums (Comment and Schwert, 1995; Heron and Lie, 2015); (c) increments on the firm's stocks of resources, like market leverage of research and development (R&D) intensity (Meoli, Paleari, and Vismara, 2013; Simeth and Cincera, 2015); (d) managers' hubris (Hayward and Hambrick, 1997; Roll, 1986); (e) CEO retirement-age group (Jenter and Lewellen, 2015); and (f) target and acquirer's relatedness to each other (Flanagan, 1996; Matsusaka, 1993; Singh and Montgomery, 1987).

Despite a few salient exceptions in M&A (i.e. Liu, Taffler and John, 2009), scholars generally see these approaches from a one-sided perspective, which is usually the acquirer's perspective (Feldman, 2020). For example, acquisition premiums literature closely considers managers' psychological characteristics (e.g., Hayward and Hambrick, 1997; Li and Tang, 2010; Tang, Li and Yang, 2012) and unfulfilled aspirations (Kim, Haleblian, and Finkelstein, 2011), but they underestimate that acquiring a company and

paying a premium is a transaction involving at least two parties to share value (Cuypers et al., 2017; Seth, et al., 2000, 2002). Simply, to have a firm acquiring another company, there is the obvious need of having a firm that is willing to be bought. Then from this bilateral perspective, it is interesting to account for the targets' overconfidence, as well as relevant literature does of the acquirer firm's CEO's overconfidence, i.e., the effect of the premium paid when the target CEO had or did not have overconfident characteristics.

In addition, the idea of accounting for both sides in the transactions seems interesting, considering the real-world dynamics of an acquisition. Specifically, non-hostile M&As provide the ideal context to study acquisition premiums from a bilateral perspective because there is a procedure pattern enforced by law that highlights the participation from each side. In a nutshell, after the announcement, the acquirer must obtain an agreement with the target, which includes a price. The basic steps after the acquirer decides to announce their intention to acquire the target are relatively standard. After the announcement, the acquirer and the target must communicate if they reach an agreement and file a SEC Schedule 14A (in addition to antitrust requirements from the FTC), which is a formal answer or communication to the shareholders (check with the SEC for details). From that point, the process may differ and have different paths. Despite the potential variations on the target's side, the M&A process is clear in the sense that the acquirer proposes its intentions and a price, and the target may or not take it, or may ask for more, etc. Then, it is expected that the acquirer's overconfidence manifests as a higher offered price to the target. Simply, it expects that the Hayward and Hambrick (1997) overconfidence effect over the acquirer's CEO will manifest in the shape of a higher premium offered to convince the target.

H2: Acquirer CEO's overconfidence is positively correlated to higher premiums offered to take over the target.

The M&A process also entails an effect from the target CEO's side. In addition to research linking overconfidence with higher acquisition premiums (i.e. Hayward and Hambrick,1997), several authors had proposed using the acquirer CEO's exacerbated confidence as a psychological element explaining other types of strategic actions. Picone, Giovanni and Minà (2014) probably conducted the most comprehensive and salient review of CEO overconfidence and hubris. From their revision, overconfidence and hubris literature have been paired to CEOs requiring lower discount rates that increase the investment levels (Ben-David, Graham and Harvey, 2007) and also with an increase in innovation (Tang, Li, and Yang, 2012). However, to the concern of a two-sided perspective, overconfident managers do not only overestimate their capability to extract value from their strategic choice (Bollaert and Petit, 2010), but they also seem to have problems to accept the market's valuation of their firms (Malmendier, Tate and Yan, 2011). If the target CEOs suffer from overconfidence, their belief is that the stock price is already discounted.

Recalling the Microsoft example, where there were two CEOs, Yang declined the business arguing that Yahoo's potential value was much higher than what Microsoft's CEO, Steve Ballmer, offered: a premium equivalent to market capitalization around $44 billion, or 62% over the most recent Yahoo stock price. This amount represented a considerably high premium when acknowledging that the market usually pays approximately an additional 40 to 50% (Haunschild, Davis-Blake and Fichman, 1994; Hayward and Hambrick, 1997). Therefore, Yang's position is difficult to understand even

more, considering that Yahoo's market value had decreased to the range of $10 billion and has since never significantly increased. Actually, Yahoo's value nowadays is greatly explained by their 2005 acquisition of 40% of Alibaba (the Chinese e-commerce company) because its search engine business was deemed nearly worthless. This situation posits an interesting example where Yahoo CEOs was showing exacerbated overconfidence. Then, for the target CEO that experiences overconfidence, the acquisition premium is perceived as lower compare to the market, putting upward pressure to the acquisition premium that may effectively close the transaction. Then, the acquisition price that fulfills the target CEO's overconfident self-valuation of the firm should then also be higher.

H3a: The higher the target CEO's overconfidence, the higher the acquisition premium required to close the transaction.
H3b: The higher the target CEO's overconfidence, the higher the variation from the offered premium and the final premium that closed the transaction.

So far, this theory development signaled that both acquirer and target influence the price at different stages of the acquisition process. However, it is important to consider and test that if both firms' CEOs are overconfident, acquirer and target together, it could potentially explain acquisition premium paid. One example is the case where both CEOs have over-expectations about their capability to extract rents. In this case, the target CEO interprets the premium as insufficient, given the unreasonable upward expectations about the capability to extract rent from the standalone firm.

Simultaneously, from the acquirer's side, given the exacerbated overconfidence, the acquirer CEO becomes less sensitive to high acquisition premiums because the CEO overestimates the ability to generate returns compared to the target's administration, the classic Hayward and Hambrick premise. Then, this overconfidence triggers the acquirer CEO's intentions and willingness to pay for a target as well as the target's skeptical perception about the size of the acquisition premium.

Insert Figure 1 about here

Figure 1 shows the potential effects from both CEOs, acquirer and target, when the transactions take place. Specifically, this paper center the attention on the cases where both CEOs have high levels of hubris (top left) and low levels of hubris (lower right). Then, assuming that an acquisition premium closes a transaction because one side, the seller, believes that the capability to extract value in a market is lower than the price the firm is requesting; at the same time, the buyer perceives that the potential value extraction in the market may be higher than the price that it will pay.

The dynamic that Figure 1 shows is that in the case of both CEOs showing high levels of hubris, one should expect that the premium may be higher. Simply, in the upper left corner (high hubris for both parties), both CEOs' willingness to pay aligns in a way that the acquirer CEO is open to paying higher premiums and the target CEO is also expecting to charge a higher premium. Following the same mechanism, there is the case where both CEOs show low levels of hubris. In this situation, both CEOs' willingness to pay is also aligned, but in the direction of lower acquisition premiums. If the target CEOs

show low levels of hubris, then the expectations about the firm's value under their command are not inflated. Similarly, the acquirer CEOs not suffering from hubris are not willing to pay higher acquisition premiums.

H4a: A positive interaction between the acquirer and the target, in the way that the higher (lower) both CEOs' overconfidence, the higher (lower) the acquisition premium paid.

H4b: A positive interaction between the acquirer and the target, in the way that the higher (lower) both CEOs' overconfidence, the higher (lower) the variation from the offered premium and the final premium that closed the transaction.

In general, the completion of the M&A deal may be the result of many other circumstances, such as "target company size, deal structure, termination fees, toehold shareholding levels of bidder companies, and the existence of competing bidder parties" (Zhang, Zhou, and Ebbers, 2011, p. 226). Now, I present a complete perspective tied to CEOs' overconfidence, which is the case of Figure 1 that also shows an additional situation, where differently than in the other cases, both CEOs' overconfidence levels are not aligned. These cases are the bottom left and the upper right in figure 1. In the bottom left situation, when the acquirer's CEO has low levels of hubris while the target CEO shows higher hubristic levels, the acquirer and the target will be less likely to obtain an agreement because the acquirer CEO is less willing to pay a higher premium, while the target CEO high levels of hubris makes him or her to expect a higher premium from the target. Similarly, the number of completed acquisitions should increase when the opposite situation is observed. This is the case where hubris from the acquirer's side

produces a willingness to pay more, and the target's willingness to receive a lower premium is also more likely because of having low hubris.

H5a: The likelihood of observing completed (uncompleted) acquisitions increases when the acquirer CEO shows high (low) levels of overconfidence.

H5b: The likelihood of observing completed (uncompleted) acquisitions increases when the target CEO shows high (low) levels of overconfidence.

EMPIRICAL DESIGN AND OPERATIONALIZATION

This section presents data from various sources, databases and manual collection of data that capture the variables that this study claims are bilaterally related to acquisition premium for both acquirer and target. In addition, this section explains the reasons to use pooled data as well as a fix-effect model and a logistic regression to find support for each hypothesis.

Sample

The first data source used to build the final sample was the Thomson Reuters One database, which provides information about merger and acquisition (M&A) events as well as a comparable level of detail for both the acquirer and the target. Because the bilateral perspective requires the same type of information on the acquirer and the target, the study used M&As in which both firms were publicly traded companies. For example, the acquisition premium calculation requires detailed information about the stock price before and after the announcement, which is only available for publicly traded companies.

In addition, in this research design, each company's CEO discourses are central to measure overconfidence. From this perspective, this study improved the Liu, Taffler and John (2009) approach because one of their sources for discourses were the SEC 8-K filings, which do not necessarily reflect CEO personality. To understand the limitations regarding the 8-K when attempting to address CEO personality, it is important to know that this form is a legal requirement from Section 404 of the Sarbanes-Oxley Act of 2002 (Ben-Rephael, Easton and Israelsen, 2017). This suggests that the likelihood that the 8-Ks may contain elements from a single subject, the CEO personality in this case, is small. Further, the 8-Ks have the purpose of complying with the Regulation Fair Disclosure, also known as the "Reg FD" (Gomes, 2004), which suggests that advisors' law firms will be in charge of such a process.

Differently, this study captures CEO discourses from "earning calls," which are free-form public interviews that analysts conduct with CEOs, usually every quarter. In these interviews, the CEOs have the chance to talk without the systematic intervention of a lawyer or an accountancy advisor, so the "true" personality is more likely to appear under this circumstance compared to 8-K filings. The sample is pooled data with a size of 233 (188 complete and 45 incomplete M&A) non-hostile offers between 2012 and 2016, where there was a transcript available before the M&A announcement for both the acquirer and the target. This data is organized as pooled data because I had time series of crossing section for each M&A. Simply, M&As happen every year and each M&A event is unique in the sense that one acquirer takes over one target. Then, when revising the historical data, the number of M&As with a transcript for both sides is small, which was solve by collecting several years (2012-2016).

In addition, despite that the M&A data available in privately owned datasets is larger than 30 years, I decided to use data after 2012 because the earning call transcripts were not easily accessible for the previous decade (mostly only for publicly traded companies). The text analysis that was performed required having transcripts, which was obtained from a subscribed user on the seekingalpha.com website. The upper limit in 2016 corresponds to the last full year when the data collection for this project started. Finally, this study used non-hostile M&As because as explained in the theoretical section, the "bargaining" stages were evident, in the sense that the target ex-post accepted or not the acquirer's "friendly" offer.

This study tested for endogeneity due to self-selection by using a propensity score matching (PSM) process. Potential multicollinearity makes one aware about endogeneity because of a self-selection problem in this case (e.g. Shaver, 1998). This study anticipated this problem because finding CEOs that provided interviews may already be a sign of overconfident managers. Specifically, the analyst earning calls are voluntary activities from publicly traded companies, which means that several of the M&A dyads that were captured did not show interviews for the acquirer firm and/or for the target. This problem of self-selection entails that the sample may also be a combination of other treatments as well. Then, the matching algorithms may potentially correct that the "estimates are generally thought of as applying to a particular group that was treated" (Ryan, Burgess & Dimick, 2015 p.4). In this case, CEOs that offered the earning calls conference were compared to acquisitions where there were no transcripts. This method is particularly appealing when the research question looks for finding the effect of a treatment in a population that may be exposed to other treatments (Li, 2013).

In simple words, it may be the case that the sample selected may present certain characteristics correlated with that they provided a conference call. For example, assume that larger companies are more willing to have earning calls. This method permits finding that such differences exist between the selected sample and the whole population in relation to the premium paid. In this case, this study did not find treatments bias after performing the PSM (results on request), which indicated that the research design did not have bias due to self-selection.

Dependent variable

This study used a fix-effect model as well as logistic regressions in which the dependent variables were the offered premium, the acquisition premium that closed the transaction, and the variation between these two for the model case. In addition, to estimate odds of observing complete acquisitions, I used a binary variable indicating 1 for completed acquisitions and 0 for uncompleted acquisitions for the logistic regression. The main reason for using a fixed-effect regression was to identify the magnitude and significance of overconfidence with respect to the size of the offered premium, the acquisition premium and the difference between them, but controlling for potential variant effect over the years.

The *acquisition premium* was calculated as the percentage price variation between the stock price four weeks before the announcement and the price paid for the acquisition. Similarly, the *offered premium* was calculated in the same way as the acquisition premium, but considering the price in the offer instead of the final price paid. These measurements for premiums are considered acceptable in the literature (Beckman

and Haunschild, 2002; Hayward and Hambrick, 1997; Laamanen, 2007) because they capture the excess of value that the acquirer is offering to pay as well as the value that the target effectively accepted. The *Premium Variation* was calculated as the difference between the acquisition premium and the offered premium. This measurement permits identifying the effects that the target CEO hubris adds to the acquisition premium, which is the price that finally closed the transaction.

The use of a logistic regression has the purpose of capturing the likelihood that a M&A will not be completed when the target CEOs have exacerbated overconfidence. The logic presented in this study signaled the target as a side that is not necessarily a price-taker. Then, if the target CEO experiences an overconfidence problem, in addition to the expected increase in the acquisition premium, the logistic regression permits showing that target CEOs that are hubristic end up increasing the likelihood of observing uncompleted M&As due to upward pricing.

Independent variables

The acquirer and target CEOs' *positivism* and *negativism* attitudes from earning calls transcripts were used to capture CEO overconfidence. As Liu, Taffler and John (2009) noted, overconfidence may be seen as a distorted and unfounded positivism about future outcomes. This study used both CEO positivism and negativism instead of the variables traditionally related to hubris such as media praise for CEOs, CEO's relative compensation and recent performance (Hayward and Hambrick, 1997) because the validity of these proxies is widely criticized (Abernethy and Wallis, 2018). In simple

words, to the best of the author's knowledge, the correlation between these variables and hubris is assumed but does not have empirical support.

Differently, this study centered its analysis on a direct symptom of managerial hubris (Picone, Giovanni and Minà 2014), which is an excess of positivism about future outcomes (Liu, Taffler and John 2009). To capture positivism and negativism from both CEOs, the acquire and the target, I used an advanced text analysis methodology. Specifically, the packages linked to text mining with R using a Tidy approach (see Silge and Robinson, 2017) with the AFFIN lexicon that contains more than 1,468 scored unigrams or words (Nielsen, 2011). Liu, Taffler and John (2009) first used positivism by extracting positivism from 8-K filings and some media files, but neglected negativism. As explained before, the use of the earning calls provided a better source to identify a freeform overconfidence from the CEOs. In addition, to capture positivism, this study also captured negativism, which is the complement that permits having a context for positivism.

Control variables

To improve the reliability of the model, this study controlled for variables that expose a mechanism explaining higher premiums. It controlled for the target's resistance to takeover that is not related to bargaining power, which influences acquisition premiums by adding a premium not directly linked to what may be attributable to firm coordination. To account for this antitakeover policy, this study used *poison pills* to see if the target had corporate instruments to deter acquirers from M&A, which was used as a binary variable: 1 to register if the company had a poison pill policy in place, or 0 if not. Simply defined,

a poison pill is a defensive mechanism to inhibit acquisitions by making aggressive takeovers excessively expensive (Comment & Schwert, 1995).

For example, in 2012, Netflix institutionalized that if an investor acquires 10% or more of the company, the actual shareholders may buy new preferred shares at a lower pre-established price, which immediately decreased the aggressive buyer's percentage of total shares. I also controlled for variables such as the number of bidders, which may positively affect the acquisition premium (Flanagan and O'Shaughnessy, 2003) due to excess demand for the target. In addition, I used the acquirer's *Cash* to capture its available "disposable" capital (Hayward & Hambrick, 1997), which may positively affect the willingness to pay a higher premium. Also, following Hayward and Hambrick (1997), this study controlled for board monitoring by accounting for CEOs having or not having the chairman position duality. This measurement captures when the CEO is also the chairman, which is important because an inquisitive board may reduce CEO overbidding. Then, I named these variables as *AcqCEOisAlsoCHAIR* and *AcqCEOisAlsoCHAIR*. Finally, besides that these were M&As between publicly traded companies, which means large companies, the study controlled for firm size because larger firms are more likely to escalate until accomplishing the acquisition (Zhang, Zhou and Ebbers, 2011). The acquirer's and the target's *Netsales* were used to account for any size difference that may explain more or less sensitivity to a higher or lower premium.

Finally, this study had a long-time frame for the observations to be captured because it does by combining data for mergers and acquisitions from 2012 to 2016 using seekingalpha.com. The purpose of collecting several years was to reach a larger number of observations of non-hostile M&As to increase confidence in the study's empirical

findings. The time window was necessary because the research design had structural conditions that required discarding several M&As, which significantly reduced the number of observations, such as the case of finding the earning calls for both sides of the M&As. This situation is controlled by the fix effect.

DESCRIPTIVE STATISTICS AND PROBABILITY DENSITY FUNCTIONS

This section presents the correlation matrix in Table 1, used in the regression models to test the hypotheses. The methodology for calculation used is the "product moment correlation coefficient" (PMCC), sometimes referred to as Pearson. In addition, it presents Figure 2 that permits comparing the positive and negative attitudes from the acquirer and target CEOs, which provides a better understanding of the data.

Insert Table 1 about here

Table 1 provides the correlation matrix for the dependent variables and independent variables of analysis. As expected, there are high levels of correlation for variables that are a partial step for the M&A mechanism described in this study. Specifically, it was observed that the variables OfferedPremium and Premium are strongly correlated (Corr=0.93). The explanation is that after the non-hostile announcement, the acquirers communicate the conditions that accompanied their intentions, including the price. Then, the target's reaction to the acquirer's offered price is not surprisingly explained in a large proportion by the initial price offer of the acquirer. The solution for this problem is the inclusion of a dependent variable explaining the

variation between the offered premium and the acquisition premium. In that way, premium variation is a variable that captures the two-sided dynamic that was proposed in the study, but without those large correlations in the models. A similar situation with large correlation is observable with the relationship between each CEO's positivism and negativism because both are "theoretically" opposites collected from the speech. Simply, the whole speech is separated into what is positive and negative, which evidently makes the data correlated.

Insert Figure 2 about here

Figure 2 shows the probability density functions for both acquirer and target CEOs' positivism and negativism. The vertical axis describes the density while the horizontal axis captures the positivism or negativism from the CEOs. Consequently, the left side, Figure 2.1, corresponds to the positivism probability density function for the acquirer and target CEOs. The target is identified with the color blue while the acquirer is identified with the color pink. This figure shows a relevant difference in positivism between the acquirer CEOs and target CEOs, which suggests that the acquirer CEOs tend to be more positive, on average, that the target CEOs. This visual difference indicates that Hypothesis 1, suggesting that the acquirer CEOs express more positivism, should be statistically supported. In contrast, the right side, Figure 2.2, follows the same axis and color framework as Figure 2.1, but does not show evidence of exacerbated differences in negativism between the acquirer and target CEOs. However, what is observable in this figure is that acquirer CEOs seem to be more skewed than the target CEOs, which may

suggest that those CEOs may intentionally control negativism, but this suspicion is not reviewed in this study.

RESULTS

As noted for Figure 2, there is "visual" evidence supporting Hypothesis 1. To confirm such results, the analysis proceeded to calculate how positivism and negativism affects the odds of being in the group of acquirers or the targets (calculation on request). The results showed a clear indication that positivism increases the log-odds of executing the role of acquirer in M&As (b=0.0028, SE=0.00031, P-Value=2e-16), because the mean effect is substantially larger than the standard error; this produces a p-value lower than 0.001. Similarly, the log-odds of being an acquirer decreases with CEO negativism (b=-0.0030, SD=0.0008, P-Value= 0.00013); this produces a p-value lower than 0.01.-

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Insert Table 2 about here

Table 2 consist of the results for ten fixed-effect models predicting the OfferedPremium in Model 1, the acquisition premium paid from Models 2 to 8, and the premium variation from Models 9 to 10. Model 1 attempts to produce support for Hypothesis 2, which indicates that acquirer CEOs showing an excess of positivism about future outcomes (Liu, Taffler and John, 2009) are more likely to offer higher premiums to take over the target. No statistical support was found for such a claim. The results do not show that the variable AcqCEOPotive (b=0.0649, SE=0.0405) has a positive effect over the OfferedPremium, but the standard error is too large to claim statistical support. Then, the p-value for the variable falls above 0.1, which means that the data does not provide

evidence that hubristic CEOs tend to bid higher. Despite such an unhelpful finding, the "tandem" variable that accompanies AcqCEOpositive, AcqCEOnegative (b=-0.2187, SE=0.1014), shows a negative effect with standard errors small enough to produce a p-value below the 0.1 threshold. This effect is not enough to support Hypothesis 2, but when noting the expected direction in both variables, AcqCEOpositive and AcqCEOnegative, the idea of a potential false negative due to sample size arises. The problem that may create a type II error is that the research design intentionally omitted the data when not having both sides' speeches, However, when including only the acquirer CEOs' speeches, the one-sided analysis includes 333 firms and shows relevant support to claim that hubristic CEOs tend to bid higher (calculation on request). Later, this finding is a relevant support for the mediation effect from hypothesis 3a.

Models 2 to 8 predict acquisition premiums, and as the hypotheses state, it was expected to observe a more relevant role from the target's CEO. Thereafter, Models 2 and 3 provide a separate look at each side's CEO overconfidence. Model 2 presents the classic view in terms of considering overconfidence only from the side of the acquirer CEO. As expected from theory (see Picone, Giovanni and Minà, 2014 for a comprehensive review), the results showed that CEOs that are more positive tend to pay higher premiums. Similarly, Model 3 found that the other side, the target CEO, shows no statistical support for the claim that the target CEO may have an important role in setting an acquisition premium. Model 4 combined both sides and showed that the unilateral approach to CEO hubris still remains with statistical support, while the target CEO does not show evidence of having an effect over the premium.

However, when considering the mediation effect that the OfferedPremium has in the theory presented, the results were considerably different. First, Model 2 accomplished the mediation requirement that requires the independent variable to be a good predictor for the independent variable. Then, Model 1 using the full set of observations (333) showed significance in terms of how AcqCEOpositivism predicts the OfferedPremium. Finally, Model 5 introduced the OfferedPremium (mediator), which showed a relevant suppression over the acquirer CEO's overconfidence and the effects on the acquisition premium. Later, using the OfferedPremium as an independent variable, Model 6 showed support for Hypothesis 3a. Specifically, Model 6 accounted for the target CEO's overconfidence and provided partial support for the variable TgCEOpositive (b=0.0644, SE=0.0329), by showing the mediation effect that the OfferedPremium had over the target's overconfidence. Furthermore, Model 7, which included simultaneously both the acquirer and the target, provided strong support for Hypothesis 3a, and for the theory that the target CEO's overconfidence is what explains the final premium paid to acquire a company. Specifically, the variable TgCEOpositive (b=0.0666, SE=0.0333) showed statistical support for Hypothesis 3a with a p-value below 0.05.

From the perspective of both CEO's dynamics, the study did not find support for Hypothesis 4a because when accounting for both CEO's overconfidence, Model 8 did not show results to claim for an interaction term (b=-0.0001, SE=0.003) that may explain the premium. Recalling that, as expected, the OfferedPremium and the Premium are strongly correlated (0.93), Models 9 and 10 solved this correlation problem using the dependent variable PremiumVariation, which is the difference between the premium offered and the premium that finally closed the transaction. With these two models, the study isolated the

effect that claims the target CEO has over the price that close the transaction. In the same manner than previous hypotheses, it found support for hypothesis 3b (b=0.0662, SE=0.0333) and did not find support for hypothesis 4a (b=-0.0001, SE=0.003).

Insert Table 3 about here

Table 3 shows the logistic regression that informs about the odds of observing a complete or incomplete M&A. Hypothesis 5a was not supported by the data, in the sense that over the four logistic models in Table 3, the variable AcqCEOpositive showed no statistical evidence to claim a null effect. Differently, hypothesis 5b was supported across all the models. In Model 2, where the regression was approached only from the target's side, the variable TgCEOpositive (b=-.0012,SE=0.0006) partially supports the claim from hypothesis 5b with a p-value lower than 0.1.- Then, in Model 3, the accounting was regressed from both sides simultaneously, and it found the variable TgCEOpositive (b=-.0011,SE=0.0006) did also provide partial support with the same p-value. Finally, Model 4 included the interaction between the variables capturing each CEO's positivism. This last model provided partial support to the claim in Hypothesis 5c, and was observable in Figure 1, but the interaction effects appear to be modest.

DISCUSSION AND CONCLUSION

The results from the study support the general proposition of accounting for a bilateral transactional perspective when reviewing acquisition premiums. Further, it was tested that acquisition premiums are better explained by the resolution of a bargaining dynamic

instead of from the traditional one-sided perspective (see (Hayward and Hambrick, 1997). Specifically, it showed that the traditional overconfidence approach to understanding acquisition premiums is myopic and unrealistic. The study data supported that an acquisition is a price equilibrium reached by two (or more) parties. One side sells when their expectations are that the value of their asset is lower than the price paid by the buyer. Similarly, the buyer buys when the expectations are that the value of the asset exceeds the price. This proposed premium perspective enriches the few pieces of literature that understand M&A as a resolution between buyer and seller, and that the competitive dynamic may influence the outcome of such a strategic transaction (Liu, Taffler and John, 2009). From a different perspective, Malmendier, Tate and Yan (2011) showed that exacerbated overconfidence makes CEOs perceive their firms as undervalued by the market, which may be the case for both CEOs, the target and the acquirer, which is what was also shown in this study.

Stretching the scope of these empirical findings, when reviewing the full set of hypotheses as a whole logical concept, the paradigm of hubris as a precursor of error in decision-making does not seem clear. Another finding from Liu, Taffler and John (2009) was that acquirer CEOs are different compared to other S&P 500 firms that are not acquirers. When that finding was complemented with the first hypothesis support, the density functions, and the other set of hypotheses, it seems that the excess of overconfidence is what differentiates the acquirer from the target, but not what explains a higher acquisition premium. For example, the study interpreted not having support in hypotheses 4a and 4b as additional evidence supporting the theory in the sense that both CEOs have a role over the premium, but clearly in different stages, and the price that

closed the transaction mostly depended on the target side. The meaning of this finding supports the idea that the excess of confidence is what defines the role of acquirer over the target, but not what explains an excess of payment from the acquirer side.

These statements are not in conflict with other findings from Liu, Taffler and John (2009) that in the short term, excessive positivism is usually paired with poor post-acquisition cumulative abnormal returns (3 day window surrounding the announcement date). They found relevance for the two-side perspective when considering long term cumulative abnormal returns where both CEOs suffer from exacerbated positivism. Both theories and findings complement well in the sense that both recognize the two-sided perspective. Then, one may attribute the acquisition behavior and lower performance to the acquirer CEO's overconfidence, while in this study the premium is better explained by the target CEO's overconfident perception of a price that motivates them to sell. Later, long-term poor performance arises as a result of the acquisition behavior that was motivated by exacerbated overconfidence and not by a rational decision-making process (Liu, Taffler and John, 2009).

In conclusion, it seems to be true that an acquisition premium closes a transaction because one side, the seller, believes that its capability to extract value in a market is lower than the price that firm is requesting. At the same time, the buyer perceives that the potential value extraction in a market may be higher than the price offered to take over the target. Therefore, it appears safe to claim that the acquirer's overconfidence explains the motivational element (James, 1890) that makes a firm to be an acquirer, while the target's overconfidence is what explains the premium. Finally, it seems that so far,

strategic management research on M&As has been suffering from a myopic one-sided perspective.

FIGURES THIRD PAPER

Figure 1

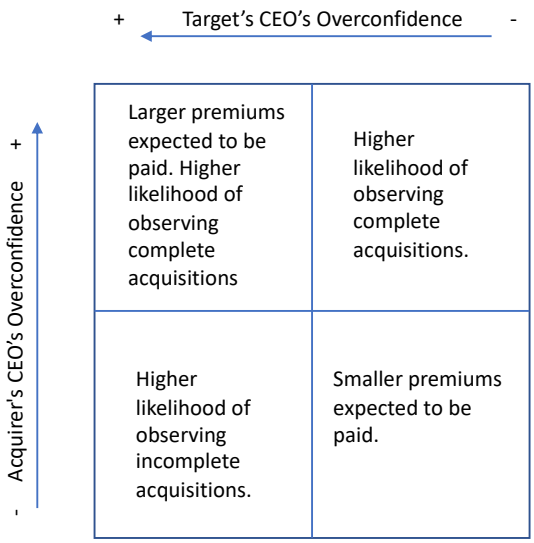
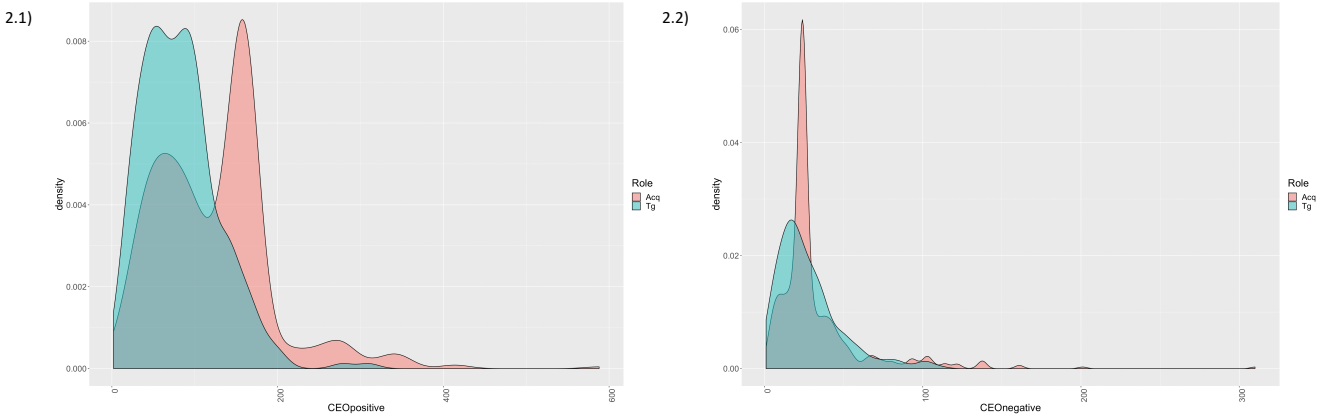


Figure 2



TABLES THIRD PAPER

Table 1

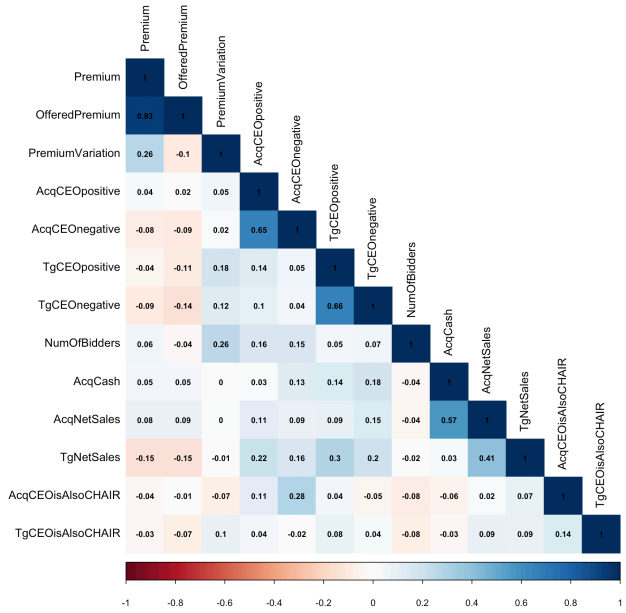


Table 2

Fix-Effect Model (2012-2016)	Dependent variable:									
	OfferedPremium			Final Premium Paid					Premium Variation	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
AcqCEOpositive	0.0717	0.0875*		0.0891*	0.0088		0.0016	0.0148	-0.0019	0.0101
	(0.0449)	(0.0456)		(0.0462)	(0.0169)		(0.0168)	(0.0316)	(0.0167)	(0.0315)
AcqCEOnegative	-0.2285*	-0.2223*		-0.2259*	-0.0174		0.0012	0.0011	0.0102	0.0102
	(0.1168)	(0.1183)		(0.1197)	(0.0438)		(0.0437)	(0.0438)	(0.0433)	(0.0434)
TgCEOpositive			0.0985	0.0763		0.0644*	0.0666**	0.0832*	0.0662**	0.0813*
			(0.0921)	(0.0923)		(0.0329)	(0.0333)	(0.0472)	(0.0333)	(0.0473)
TgCEOnegative			-0.2760	-0.2863		-0.0130	-0.0201	-0.0215	-0.0095	-0.0107
			(0.1926)	(0.1923)		(0.0691)	(0.0698)	(0.0700)	(0.0695)	(0.0697)
NumOfBidders	-3.4381	12.1643	13.0531	13.0709	16.6896***	17.0160***	16.5235***	16.6914***	16.6603***	16.8138***
	(13.3808)	(13.5505)	(13.4036)	(13.6468)	(4.9700)	(4.7842)	(4.9204)	(4.9428)	(4.9310)	(4.9542)
AcqCash	0.0002	0.000004	-0.0001	0.00002	0.000001	-0.00003	-0.00003	-0.00003	-0.00004	-0.00004
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
PoisonPill										
AcqCEOisAlsoCHAIR	1.3086	0.0625		-0.4803	-1.5775		-2.4868	-2.3891	-2.5663	-2.4787
	(6.2006)	(6.2764)		(6.4888)	(2.3017)		(2.3110)	(2.3244)	(2.3157)	(2.3293)
TgCEOisAlsoCHAIR			-0.7509	-1.2755		2.8776	3.2413	3.2937	3.4202	3.4697
			(6.1579)	(6.2171)		(2.1998)	(2.2450)	(2.2524)	(2.2464)	(2.2543)
AcqNetSales	0.00002	0.0002	0.0002	0.0002	0.00001	0.00002	0.00002	0.00002	0.00002	0.00002
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.00004)	(0.00004)	(0.00004)	(0.00004)	(0.00004)	(0.00004)
TgNetSales		-0.0016**	-0.0017**	-0.0016**	-0.0001	-0.0003	-0.0003	-0.0003	-0.0002	-0.0002
		(0.0007)	(0.0007)	(0.0007)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
OfferedPremium					0.9545***	0.9627***	0.9619***	0.9614***		
					(0.0283)	(0.0277)	(0.0283)	(0.0283)		
AcqCEOpositive:TgCEOpositive								-0.0001		-0.0001
								(0.0003)		(0.0003)
Fix-Effect (2012-2016)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	188	188	188	188	188	188	188	188	188	188
R2	0.5450	0.5646	0.5582	0.5702	0.9418	0.9441	0.9445	0.9446	0.1359	0.1369
Adjusted R2	0.5168	0.5349	0.5281	0.5330	0.9375	0.9399	0.9393	0.9390	0.0610	0.0566
Residual Std. Error	36.0735 (df = 177)	36.5004 (df = 176)	36.7666 (df = 176)	36.5753 (df = 173)	13.3825 (df = 175)	13.1195 (df = 175)	13.1844 (df = 172)	13.2134 (df = 171)	13.2156 (df = 173)	13.2462 (df = 172)
F Statistic	19.2772*** (df = 11; 177)	19.8152*** (df = 12; 176)	18.5292*** (df = 12; 176)	15.3019*** (df = 15; 173)	217.8266*** (df = 13; 175)	227.1923*** (df = 13; 175)	182.8610*** (df = 16; 172)	171.3648*** (df = 17; 171)	1.8139** (df = 15; 173)	1.7053** (df = 16; 172)
Note:										*p<0.1; **p<0.05; ***p<0.01

Table 3

Logistic Reg.	Dependent variable:			
	Complete M&A = 1 Incomplete = 0			
	(1)	(2)	(3)	(4)
AcqCEOpositive	0.0001		0.0001	−0.0009
	(0.0004)		(0.0004)	(0.0007)
AcqCEOnegative	0.0003		0.0002	0.0001
	(0.0009)		(0.0009)	(0.0009)
TgCEOpositive		−0.0012*	−0.0011*	−0.0023**
		(0.0006)	(0.0006)	(0.0009)
TgCEOnegative		−0.0001	−0.0003	−0.0002
		(0.0014)	(0.0015)	(0.0015)
NumOfBidders	−0.4800***	−0.4268***	−0.4343***	−0.4335***
	(0.0776)	(0.0779)	(0.0794)	(0.0791)
AcqCash	0.000000	0.000001	0.000001	0.000001
	(0.000002)	(0.000002)	(0.000002)	(0.000002)
PoisonPill	−0.9898***	−0.9174***	−0.9287***	−0.9244***
	(0.1905)	(0.1859)	(0.1891)	(0.1883)
AcqCEOisAlsoCHAIR	−0.0355		−0.0283	−0.0328
	(0.0498)		(0.0507)	(0.0506)
TgCEOisAlsoCHAIR		0.0242	0.0270	0.0243
		(0.0479)	(0.0487)	(0.0485)
OfferedPremium	0.0002	0.0001	0.0001	0.0002
	(0.0006)	(0.0006)	(0.0006)	(0.0006)
AcqCEOpositive:TgCEOpositive				0.00001*
				(0.00001)
Observations	223	223	223	223
Log Likelihood	−58.3599	−55.3367	−54.9638	−53.4221
Akaike Inf. Crit.	140.7198	134.6734	139.9277	138.8442
Note:				*p<0.1; **p<0.05; ***p<0.01

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DISSEERTATION DISCUSSION AND CONCLUSION

When considering the dissertation as a whole, the most relevant contribution is to show that strategic transactions are better explained by a two-sided competitive perspective. I intentionally add the competitive dimension to the construct because, in my eyes, that constitutes a key element in business. The reason is that, as Feldman (2020) noted, strategic transactions, such as M&A, divestitures, contracts, and alliances are dyadic in nature, then research devoted to those phenomena should be reviewed in a dyadic manner. Simply, observing a firm acquiring a target requires having another firm willing to be acquired, and not considering the other side's perspective obscures the potential findings in such research. The competitive perspective is important from the inception of the potential strategic transaction, in the sense of the role that each firm will play in the bargaining. Then, when we have data from a M&A, we have clearly identified an acquirer and a target, but that is exclusively an ex-post "picture" of how the strategic transaction ended. For example, in the famous movie *Thelma and Louise*, the last part of the movie, shows two women, killing a man, participating in a police chase, and finally committing suicide. Watching only the last ten minutes of the movie, will probably bring up the wrong conclusion, and not allow one to understand if they are criminals or victims of gender bias system. Further, the last scene is simply the conclusion of a series of unfortunate situations, mostly a product of systemic patriarchal discrimination, which put Thelma and Louise in the criminal circumstances of the last scenes (Cooper, 1999).

With M&A, the data usually also have the same type of last-scene adolescence in perspective as the Thelma and Louise example. What we observe is a last-scene snapshot

of who is the acquirer and the target, but no clarity about what brought them there into each particular role. The point of my argument is that from transaction cost economics (TCE), we know that governance in strategic transaction as well as the firm boundaries are mandated by bargaining cost reduction (Williamson, 1975, 1985, 1991). Then, from a TCE perspective, when there is a value creation opportunity, both firms have the dilemma of finding a governance structure that fits for each. In the first paper, I presented a solution to this snapshot problem by modeling the value creation and value sharing problem without assuming that the players will specifically have roles, such as acquirer or target. In simple words, the model does not anticipate that firm A will acquire firm B or vice versa.

Therefore, the model considers that firms need to solve a value creation and value sharing problem in the presence of market frictions that makes the joint outcome, which is also the largest joint value, difficult to achieve due to market frictions. In addition, based on the assumption that there is no money left on the table, or differently, "that no good deal comes undone" (Chatain and Mindruta, 2017), it is reasonable to claim that the Nash product should be rarely observed (the lowest possible joint outcome). Having said that, I showed that it is more likely that firms will solve such a business opportunity by the coordination equilibrium or by a hierarchy (generalized as property transfer), but not by returning to the Nash equilibrium when bargaining fails. Because the market and the hierarchy are equivalent governance structures, we expect that the value created by the firms' coordination will also be shared in a similar fashion if the solution implies property transfer or a side payment arrangement. The reason is that the willingness to deal represents the firm's capability to bring and extract value from the coalition, as well

as the firm's exposure to risk in the sense that the firm limits its value extraction to each firm's capability to perform the value creation task in a better way compared to its counterpart. In simple words, each player will obtain only the value that they can create more efficiently compared to the other party in the coalition whether by contract or hierarchy.

This first theoretical paper provided the grounding for developing the two empiric papers that complement this dissertation. First, when rationalizing the scope of the model, the need for having a bilateral competitive perspective seems unavoidable because the portion of value that one player obtains is in relationship to the value created by both players and the portion of value that the other player may aspire to have. Therefore, this side payment structure applies adequately to the analysis of strategic transaction; that they are inertly bilateral (Feldman, 2020). Specifically, in the second paper I operationalize the changes in each firm's willingness to deal, which has the effect of changing each firm value capture.

Then, this second paper researches how knowledge asymmetries between both sides may contribute to larger acquisition premiums and post-acquisition low performance. Simply, from the coordination equilibrium, one may conclude that the firm with a knowledge advantage will capture more value whether in a market or a hierarchy. Then, if such a firm ends up being the target, it is expected that the premium paid by the acquirer will be larger. In addition, I found evidence to suggest that when managers do not have sufficient knowledge of what they are acquiring, post-acquisition performance suffers because both are paying too much and are unable to fully capture the potential synergies of the combined entity. From the coordination equilibrium, I observe that each

side increments their capability to capture value in a strategic transaction when they better understand how its resources may be valuable for the other firm. However, the most relevant issue, is that, as the model predicts, when both sides have sufficient knowledge about the other firm's business, the premium paid to acquire the other business tends to be significantly smaller. This logic makes sense when considering that, for example, a seller with a knowledge advantage may have better chances to make the asset scarce or to "shine" in ways that the buyer may find more attractive. Differently, I show that in M&A, when both sides have a clear understanding about the potential value that both firms working jointly may achieve, the room for price distortion reduces. I found consistent evidence that the acquisition premium is lower when both firms had sufficient knowledge of each other's resource synergies in their own context.

With the third and last paper, which contributes to the dissertation by exploring and testing the overconfidence component in acquisition premium, I provide an additional element of support to the bilateral competitive approach. Specifically, the bilateral hubris is shown to be more than relevant when predicting the premium but in a different way compared to the extant paradigm. So far, Hayward and Hambrick's (1997) seminal paper had positioned strategic management research in an overestimated acquirer's perspective for acquisition premiums. Further, as Picone, Giovanni and Minà (2014) reviewed, CEO overconfidence is considered a failure that may explain several strategic choices and behavior, like riskier product pioneering (Simon and Houghton, 2003), over investment behavior (Ben-David, Graham and Harvey, 2007), and increased likelihood to become an acquirer (Liu, Taffler and John, 2009). However, these studies

did not review strategic transaction with what is probably the most relevant element in a transaction: the price that closes the deal.

Regarding the under-researched value capture and value sharing problem (Cuypers et al., 2017) the premium paid/received is essential because it reflects how firms divided the value that firms expect to create by the synergy from the M&A. Different than in the second paper, where the value capture is reviewed from a bilateral rational perspective, in this third paper firms' value capture responds to each CEO's value perception, which has been shown to be positively biased when CEOs have exacerbated overconfidence. When considering both CEOs' overconfidence symptoms, I show that the idea that the sale price to acquire a firm, the premium, is mostly affected by the seller CEO's perception of value but not by the acquirer CEO's. This crucial finding is important, but also more realistic because it does not make sense that an unsolicited transaction clears without considering the seller's aspirations. Therefore, in addition to the quantitative support presented in the paper, it is undeniable that the buyer-seller dynamic, the acquirer-target in this case, requires research considering both sides; the bilateral competitive approach.

I refer to bilateral competitive approach instead of the dyadic perspective proposed by Feldman (2020) because the dyadic unit of analysis is not sufficient when considering strategic transactions. Further, research already considers dyadic issues like relatedness to predict the premium based on the potential synergies (Flanagan, 1996; Matsusaka, 1993; Singh and Montgomery, 1987). The problem is that when the acquisition and the premium is treated as a transaction, relatedness is symmetric for both sides, which impedes the measurement of heterogeneity in terms of inter-firm

competition to capture the potential joint value created. From a different perspective, relatedness between firms is the same for the target and for the acquirer, which may permit us to estimate potential synergies, but neutralizes any opportunity to measure or capture any competitive asymmetry from that variable. Instead, the competitive bilateral approach requires analyzing the dyad in terms of how each firm may advance over the other firm's value, which by the way is substantially more realistic and belted to strategy research foundation (Coase, 1937; Williamson, 1975).

In addition, the change of analytic perspective, from a one-sided, to dyadic, and then to a bilateral competitive dynamic entails relevant empirical challenge. The reason is that data collection requires a higher level of detail. So far, it is clear in this dissertation that elements like patent citation between incumbents and both CEOs' overconfidence may provide elements to predict strategic transaction pricing and potentially, post-acquisition performance. The problem is that, the level of detail that a bilateral competitive perspective requires, entails research searching for more elements that provide a bargaining or opportunistic advantage from one firm to the other. From that perspective, this dissertation propels a foundation for future research and variables of study. For example, when cleaning the data from the second paper, I found a set of M&A that occurred between one listed firm a delisted target, where the premiums in these cases where exorbitant. However, the reason for having these "crazy" high premiums is that firms are delisted and the stock price "freezes" when those firms fall below the $1 threshold. Then, the premium is calculated by the stock price paid by the acquirer, and that under $1 freeze price, which inflates the premium. In these cases, the premium is larger compared to the M&A between listed firms, but it may be the case that even when

paying a larger premium, post-acquisition performs may still be substantially better given the price opportunism from the acquirer.

In a similar fusion, this bilateral competitive perspective may be extended to other type of strategic transactions, such as alliances. For example, research on alliances has emphasized product market similarities and complementarities because firm-alliance relatedness lowers initial integration and monitoring costs associated with the alliance (Villalonga & McGahan, 2005) and inter-partner relatedness increases the likelihood of synergistic value (e.g. Folta, 1998). However, these approaches ignore competition from the alliance (Hoffmann et al., 2018) and do not account for differences between partners in their product market distance to the alliance. For example, the partner further from the alliance may obtain knowledge that "belongs" closer to the other partner's context and later move into a more direct competitive position with the closer partner (Oxley & Sampson, 2004). In addition to the potential ex-post competition from the further partner, the closer partner to the alliance may also expedite competition from the alliance if it is not capable to effectively govern it. This example shows that in these strategic transactions the distance between partners and between each partner and the alliance may provide a source of competitive asymmetry that requires control by managers.

Finally, considering that non-Pareto situations occur frequently, the inability to reach an agreement would imply that an opportunity for value creation is unrealized (Kim & Mahoney, 2002). However, the management field relies on the fact that no money is left on the table (Chatain and Mindruta, 2017) because both firms are more likely to capture such value. Then, to understand strategic transactions as a bilateral competition for value capture is essential, and not to do it is myopic and unrealistic. With this

dissertation theory, the bilateral competitive view, we may find explanations that suggest that managers may not know what they are buying as well as providing grounding for claiming that the acquires' CEO overconfidence seems irrelevant when reviewing acquisition premiums; the seller is the one that has the last word.

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